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EDUCATIONAL RESTRICTIONS TO AGRICULTURAL SUCCESS AND THE RELATIONSHIP OF EDUCATION TO INCOME AMONG FARMERS.
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*AGRICULTURE, *AGRICULTURAL RESEARCH PROJECTS, *ECONOMIC FACTORS, *EDUCATIONAL PLANNING, *EDUCATIONAL STATUS COMPARISON, AGRICULTURAL TRENDS, ECONOMIC CLIMATE, SURVEYS, QUESTIONNARIES, MINNESOTA, MINNEAPOLIS, INSTITUTION ON FARM TRAINING (I.O.F.T.)

THE MAIN PURPOSE OF THIS PROJECT WAS TO STUDY THE RELATIONSHIPS OF EDUCATIONAL, ECONOMIC, AND BIOGRAPHICAL VARIABLES TO FARM SUCCESS. UNDERSTANDING THESE RELATIONSHIPS WAS PREREQUISITE TO DEVISING A MEANS OF PREDICTING SUCCESS FOR A YOUNG MAN CONTEMPLATING PRODUCTION AGRICULTURE AS AN OCCUPATION. SPECIAL ATTENTION WAS FOCUSED ON THE ROLE OF THE EDUCATIONAL COMPONENT IN THAT PREDICTION. IN ADDITION, A DETERMINATION WAS MADE OF THE RELATIONSHIP OF FARM FINANCIAL SUCCESS TO THE ACHIEVEMENT AND APTITUDE OF FARM CHILDREN IN SCHOOL. THE SAMPLE CONSISTED OF ALL VETERANS WHO WERE CURRENTLY FARMING AND WHO HAD BEEN TRAINED AT 40 SCHOOLS THAT STILL RETAINED THEIR RECORDS OF THE I.O.F.T. PROGRAM. THE EDUCATIONAL INPUT WAS ASSESSED FROM THE VETERANS TRAINING RECORD, FILES OF THE ARMED SERVICES, QUESTIONNAIRES, AND INTERVIEWS. GROSS INCOME, NET INCOME, AND YEARLY GAIN OF NET WORTH INFORMATION WERE OBTAINED FROM QUESTIONNAIRES. INDEPENDENT VARIABLES WERE AGE, TENURE STATUS, BEGINNING CAPITAL, SIZE OF BUSINESS, NUMBER OF CHILDREN, HIGHEST GRADE COMPLETED, GCT AND MAT SCORES AND MONTHS OF INSTRUCTION AT THE I.O.F.T. THE DATA WERE MEASURED AND THE RESULTS WERE--(1) INCOME DATA WERE LIMITED AND CONSIDERED INSUFFICIENT TO USE AS A FARM SUCCESS MEASURE, (2) RECENT ADULT EDUCATION WAS SIGNIFICANT IN GROSS INCOME AND YEARLY GAIN, AND (3) NO SIGNIFICANT RELATIONSHIP EXISTS BETWEEN INCOME AND THE APTITUDE OF FARM CHILDREN. (GC)

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EDUCATIONAL RESTRICTIONS TO AGRICULTURAL SUCCESS AND THE RELATIONSHIP OF EDUCATION TO INCOME AMONG FARMERS

Cooperative Research Project 2604

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Minneapolis, Minnesota

1966

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FORWARD

The initial structuring of the proposal for this project was a University departmental effort involving Dr. Gordon Swanson, Dr. Paul Marvin, Dr. Harry Kitts and Dr. Milo Peterson as project initiators. Continuous cooperation and consultation has occurred among these initiators and with the project staff throughout the study.

During the early stages of the project the project director was Dr. Joseph Cvancara whose earlier research is an important part of the literature to which this project contributes. During most of the study, the project director was Dr. Edgar Persons.

Liason with the project was maintained by Dr. Alice Y. Scates and Dr. Richard Bloom of the Office of Education.

The number of specialists and consultants who contributed to data gathering and analysis is too great to permit individual acknowledgement. The accessibility to important data from the files of the Armed Services was a particularly valuable contribution to this study. The opportunity to conduct the study is gratefully acknowledged to the U.S. Office of Education.

Edgar Persons
Gordon Swanson

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CHAPTER I

INTRODUCTION AND THE PROBLEM

Introduction

The problem of this study is broadly related to the farm problem of which economists and agricultural educators often speak. It is also an educational problem, involving a large segment of the school population. The educational implications of the problem cannot be adequately defined and described without first describing the elements of the agricultural situation in which the educational problem is closely entwined.

The proportion of total national income which accrues to production agriculture is continuing the trend of steady decline. The phenomenon is not unexpected in a nation experiencing steady economic growth. Neither is the decline in the proportion of population classed as farmers an unexpected event nor cause for undue concern. The phenomenon which has been of concern is the relatively poor economic condition of those who remain on the farm in relation to their non-farm contemporaries. In spite of relatively stable total national gross farm income and declining farm population, the individual farm operator has not enjoyed the economic success of his off-farm cousin.

Agriculture has been beneficiary of numerous public programs. The non-agricultural population has at times sanctioned when adverse farm economic conditions have prompted mass migration to off-farm living and resulted in potential danger to the nation's food supply.

Programs of public support for rural credit have helped farm operators and owners find greater stability in an investment frequently subject to high risk and uncertainty.

What relationship do these factors have to the educational problems of todays youth? In spite of the small proportion of the total population that farm operators comprise, they still number about three million[1]. Eventually most of these three million farm operators will need to be replaced as death and retirement or occupational change thin their ranks. It is estimated that about 1.5 per cent of this total is needed currently each year to fill this need[2]. These beginning farmers will be in need of not only sound training but also sound counsel.

When young men consider production agriculture as an occupation they should have some yardstick by which to measure their probable success. In a business where the investment of both human and physical resources are high, and where an occupational decision is not easily reversed once established, the importance of such a measure becomes even more critical.

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[1] United States Bureau of the Census, United States Census of Agriculture. 1960 (Washington: Government Printing Office)

[2] Reiss, Franklin J., Getting Started and Established in Farming - North Central Region, Publication 8, University of Illinois, (Urbana, Illinois: University of Illinois, 1960) p. 6.

The major purpose of this study is to determine what part the educational component plays in devising a predictive measure for farm success.

The Problem Delimited

In an occupational choice that requires a high investment in physical capital, involves high risks and irreversible decisions, the educational prerequisites are very important. In agriculture these educational considerations have not been given much attention. It is not possible to describe an itinerary of young men entering production farming. Neither is it possible to describe the relationships between the educational components and farm income which would serve to guide both the decision and the itinerary. The absence of such information has made the need to rescue the failures in the farm business through retraining and development programs more acute; a high price to pay because of the dearth of information.

This study will be confined to answering three general questions concerning the predictive measure previously alluded to.

First: What part does the education component of formal education, adult education, and aptitude play in the success of a farm business when the agricultural and economic factors of farm production as well as the socio-biological status of the beginning farmer are also considered?

Second: Considered independently, is there any significant relationship between the various measures of the educational component and the various measures of farm business success?

Third: If it is true that there is a wide variability in the financial success of farm families, is the success of the farm business reflected in the school achievement and aptitude of farmers children?

Concerning the first of these questions, it is the intent of this study to examine the micro-economic input resources of the beginning farm business in sufficient detail to permit the determination of the separate and combined relationships of the input measures to various measures of farm success. The study should culminate in a prediction or regression equation which would indicate the relative importance or each of the input factors to farm success, as well as the inter-relationship of the input factors. From this prediction equation some inference can be made for predicting the success of young men in the production farming business.

The purpose of the second objective is principally to further define and describe the independent relationships of the various measures of the education component to the selected measures of farm success. The purpose is to measure the effects of each of the sub-components of the education factor while the rest of the sub-components are held constant. Elimination of the interaction effect of the sub-components allows a more careful inspection of each of the factors such as intelligence, and formal schooling in their role in predicting farm business success.

A positive relationship between farm success and the aptitude and achievement of farm children may suggest more careful consideration of the worth of programs designed to raise farm income levels. There is a reason to believe the relationships between financial success of parents and children's aptitudes and school achievement which are evident in city populations, may not be true for the rural farm sector. Adequate measures of farm income, formidable barriers to ascertaining if such relationships do exist, are available as part of the major inquiry of this study. Thus, this study serves as a convenient vehicle for measuring this relationship.

The Significance of the Problem

An examination of the farm records analysed by the Austin Area Vocational School[3] for the calendar year 1964 points to some of the factors which add significance to this study. Average farms of modest size required capital investments of about $75,000 in fixed and working capital, yet returned only $3,858 to the farm operator for his labor.

This huge investment in capital represents not only the physical resources which the farmer must amass to be competitive within the industry, but represents also the factor which perhaps more than any other is responsible for the irreversibility of the decision to farm and the immobility of the established farm operator.

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[3] Austin Area Vocational Schools, "Report of 1964 Vocational Agriculture Farm Analysis", (Austin, Minnesota, 1965), p. 3,4.

Further examination of this report reveals that the agricultural factors alone cannot account for the wide variability in earning ability among various farmers from within the same geographical region of the state. Although the most profitable farm operators exceeded the least profitable in farm size by forty-four acres and in investment by about $10,000 these two factors alone cannot account for the difference shown in return to labor of over $10,000 per farm.

What are the factors that account for the difference exhibited by these groups of farmers? It may be assumed that at least a portion of this difference is due to the variations in the educational component with which this study deals. Should the effects of the educational component be significantly great, the adaptation of the prediction information to present day counseling of prospective farm operators may help to eliminate some of the failuresin the agricultural production industry and provide for the channeling of suitable young men into this occupational field. The vast increase in agricultural technology with its accompanying demand for more highly skilled production agricultural workers, intensifies the need for being able to predict the success of the prospective farm operator.

If educational factors significantly affect farm success, educational programs of the public secondary and post-secondary schools which offer training in production agriculture may be subject to critical review. The major purpose and objectives of the vocational agricultural training programs in the secondary schools may need to be re-examined.

One of the measures of the success of the secondary program to date, has been the number of graduates that find placement in production agriculture as farm operators. In this respect, vocational agriculture in the secondary school has aimed toward an occupational rather than a pre-occupational culmination. If the years of formal schooling are significantly related to farm success, more emphasis may need to be placed on the post-secondary levels of training. Measures of success in the secondary program may then be based not on the number of students who return immediately to the farm, but rather on the number that enter post-secondary training and later become successfully established as farm operators.

As the goals for the secondary vocational programs change, it is logical that the content and organization of the curriculum of the secondary and post-secondary vocational agriculture programs would undergo considerable revision.

A measure of the relationship of farm financial success to the achievement and aptitude of farm children certainly is of significant value when considering federal legislation which ties a measure of need for improved educational opportunity to the income of parents. While such measures may, in the long term, be indicitive of the local financial support of education that low income districts or neighborhoods could muster, low correlations between incomes and success would suggest that other criteria should be used to determine need. A failure of these factors to show high relationships would suggest also, that the problem should be further examined in rural farm, rural non-farm and urban areas to determine if a significant difference exists in these three sociological settings. Marked differences in relationships may prompt some change in the criteria for legislation for income improvement and educational development.

CHAPTER II

REVIEW OF LITERATURE

While this study is principally concerned with the micro-economic inputs of education in the farm business, the literature review which follows deals almost exclusively with the business of getting established in farming. Little literature is available on the micro-economic aspects of the educational resources of the farm business operator.

Brief mention is made in the A.V.A. publication of 1952 on two aspects of the micro-economic education component[1]. Farmers who had completed high school during the period of veteran training were more apt to have a daily paper to read. The difference between high school graduates and eighth grade graduates was about 23 per cent in this instance. The assumption could be made that those with higher education levels would avail themselves of written material to a higher degree than the more poorly educated. This fact may account for some increased use of timely information by the more highly educated, with eventual increase in income and success.

Education level and tenure also appear to have some relationship[2]. Those with the lowest education level were also lowest in tenure status. More than twice as many farmers were either owners or partners rather than tenants when they had twelve or more years of school, compared to those with less than twelve years of school.

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[1] Committee on Research in Education of Farm Veterans, Education of Veterans in Farming, American Vocational Association, Inc., (Washington: American Vocational Association, 1952) p. 38.

A study most nearly approaching the micro-economic aspects of the educational investments in agriculture is that of Cvancara[3]. His study evaluated the economic effects of enrollment of a farm family in an adult farm management program by using thirty-three matched pairs of farms for the years 1961, 1962 and 1963. He analysed the differences in cash income that accrued to each group for each year they participated in the educational program. He reported a return for participation of about $500 for each year the farmer was in the study.

Although the small number of farms studied limits the usefullness of the report, it is the first significant research which strikes at the micro-economic aspects of the educational investment.

In brief, the study showed that participation in adult education was still another way to increase income. Because of the high dollar return to the cooperator, one can assume that this type of instruction was a profitable production input.

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[2] Ibid. p. 51.

[3] Cvancara, Joseph G., "Input-Output Relationships Among Selected Intellectual Investments in Agriculture", (Ph.D. Thesis, University of Minnesota, Minneapolis, 1964).

Some early work by Peterson and Kinard hinted at some of the favorable relationships of education to farm income[4]. Dairy farmers in South Carolina, showed a steady increase in the return to labor as the amount of education of the farm operator increased. Not only did the income per farmer increase considerably (income of farmers with 8-12 years of schooling was 150 per cent of income for persons with 5-7 years of schooling) as the years of schooling increased, but considerably fewer farmers experienced negative incomes.

Another study by Peterson[5] showed similar relationships among eighty seven farmers in Anderson county, South Carolina. The difference in earnings in this group between grade school and high school graduates was equal to 54 per cent of the labor earnings of the grade school graduate.

Peterson states:

> The education obtained by the operators of the farms seems to have a close relationship to the labor income. This does not mean that education is a specific factor such as labor efficiency, but it does mean that those farm operators with the most education seem to be able to manage their farms on a more profitable basis then farm operators with little or no education.

A more recent publication by the United States Chamber of Commerce puts equally as much emphasis on the value of education for farm operators[6]. It was reported that about 89 per cent of the farms producing less than $3,000 per year were operated by men with less than five years of school. As education levels advanced from eight to twelve years the prospect of producing over $10,000 of farm produce per year more than doubled, while the prospect of producing less than $3,000 of farm produce was reduced by 22 per cent. Each increase in education level was matched by a corresponding increase in the value of farm produce.

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[4] Kinard, J.D., Peterson, M.J., Farm Management in Newberry County, South Carolina. South Carolina Agricultural Experiment Station of Clemson College, Bulletin 338, (Clemson, South Carolina: Clemson College, 1942)

[5] Peterson, M.J., An Economic Study of Agriculture in the Little Beaverdam Creek Area, Anderson County, South Carolina, Bulletin 332, South Carolina Agricultural Experiment Station of Clemson College, (Clemson, South Carolina: Clemson College, 1941)p. 28.

A similar comparison of the effects of education on earning ability places a value in terms of lifetime earnings of $54,000 on the completion of grade twelve as compared to the lifetime earnings of the eigth grade graduate.

These studies, principally macro-economic in nature, have each dealt with only one phase of the education component as identified in the current study. This phase, formal school education, while certainly of importance to the study of the education-income relationship, does not account for the interactions that may occur between education level, aptitudes and post-high school training.

While the literature relating the education component to farm success is conspicuously scarce, the same is not true of literature relating to the other investment resources of the beginning farmer. A number of such sources which are applicable to the geographical region and to the chronological time span of the current study group are related in the following section. Note that none of these studies makes reference to the role that might be played by the education component in the success of farm business.

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[6] Education: An Investment in People. (Washington: United States Chamber of Commerce, 1954) p. 4.

Beneke and Pond[7] analysed the labor and capital used and the financial return of four hundred and eighty-eight ex-servicemen starting farming in Southeastern Minnesota. Net worth progress was positive and regular. Generally, the most limiting factor in terms of financial success was the size of the farm business. Business size in many instances was limited by the amount of capital available. Renters and partnerships had larger volumes and consequently larger financial returns.

Pond[8] and associates reported later on a study comparing veteran and non-veteran beginning farmers. Information on the two hundred and forty-six veterans was obtained in part from farm veterans' records kept as part of their training program and in part from survey and interview. The records for the one hundred and four non-veteran trainees were collected by survey and interview.

The principal information obtained was (1) amount of initial capital owned, (2) sources of credit used, (3) problems encountered and (4) tenure arrangements.

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[7] Beneke, Raymond R, George A. Pond, Starting Farming in Southeastern Minnesota, Bulletin 405, University of Minnesota, (Minneapolis: University of Minnesota, 1950)

[8] Pond, George A., Henning Swanson, William CaVert, Starting Farming Today, University of Minnesota, Station Bulletin 428, (Minneapolis: University of Minnesota, 1955)

The principal difference in the two groups was in the amount of initial capital owned, with veterans owning less capital than non-veterans. The veteran group, however, placed less significance on the lack of credit as a limiting factor than did the non-veteran group. The principal problems encountered by both groups were in the areas of lease arrangements or family farm relationships.

The pattern of establishment for beginning farmers in the period following the Korean conflict was reported by Cochran and associates[9]. The five principal categories of concern were tenure status, farm size, investment, earnings, and gain in net worth. As would be expected, the large majority of the beginning farmers started as renters or partners rather than owners. However, the percentage of beginners owning farms varied considerably among various regions of the state. About 40 per cent were classed as owners in the low land-value areas in the central and northeast sections of the state while only 5 per cent owned land in the high valued southwestern area of the state. Further study of the farm capital investment of veterans in various parts of the state indicated that farm ownership was not a prerequisite for large capital investment, gain in net worth or returns.

It is important to note the differences in the amount of capital invested by these veterans at the start of their training program. The owners had invested $16,609 in farm capital, partners invested $6,871 and renters only $4,935. It can be seen from this illustration that capital needs for the beginning farmer are highly related to the type of tenure status he is able to secure.

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[9] Cochran, George R., Field, A.M. et al, General Survey Report, Public Law 550 and Public Law 894, Institutional On-Farm Training in Minnesota, Agricultural Education Unit, Minnesota State Department of Education, (St. Paul: State Department of Education, 1959)

Size of farm business is closely related to the type of tenure arrangement. Pond[10] indicated that the lack of farm size was most frequently cited as a cause of poor returns by beginning farmers. This study indicated that farm size varied with the type of tenure arrangement. Owners were able to secure smaller farms, with their limited capital resources. In spite of smaller farm size, however, this group had the greatest gain in net worth.

Reiss[11] reports also on the financial requirements for entry into farming. This summary of reports of thirteen states in the North Central region points to some of the findings in regard to locating a suitable farm, lease arrangements, family agreements and land acquisition by purchase or lease with the attendant credit and capital requirements.

One-man farms may easily require a tenant investment of $15,000 or more to provide the machinery and equipment, livestock and feed and grain inventory to provide full time employment. In addition, the landlord would have invested capital to provide land varying from the one hundred acres considered necessary in Kentucky to the 1,280 to 6,000 acres in the cattle and sheep country of South Dakota needed for full time employment.

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[10] Beneke, Raymond R., George Pond, op. cit.

[11] Reiss, Franklin J., op. cit.

Because total capital requirements are high for the beginning farmer, these requirements can be minimized by (1) shifting the burden of capital to the landlord through suitable lease arrangement, (2) substituting labor for capital, and (3) substituting annual cash payments for ownership requirements. In addition to making a start, farmers look toward firm establishment in the business. This establishment is marked by (1) an adequate volume of business, (2) managerial control, (3) security of tenure and (4) a controlling equity.

The subject of the limited opportunity for young men to enter farming as an occupation with its attendant problems of large capital requirements and a diminishing supply of available land has been cause for considerable study in the North Central region[12]. Not all land which is available for lease or sale is available to the beginning farmer. Often he is not able to compete with the established farmer because of lack of capital and experience in farm operation.

Numerous other works could be cited to illustrate some of the problems attendant with establishment in farming. The literature previously cited has given some indication of the major concerns of the beginning farmer. These authors have emphasized the importance of farm size and adequate capital resources and have provided general descriptions of the financial status and progress of the beginning farmer. Some alluded to the necessity of adequate training in the technical aspects of farm production, but none have attempted to suggest the substitution value of this education for some of the physical tangible beginning resources.

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[12] Opportunities of Beginning Farmers, North Central Regional Bulletin 102, Experiment Station, University of Nebraska, (Lincoln: University of Nebraska, 1960)

Studies of children in urban schools have shown the relationship between parental income and children's achievement to be positive and linear[13]. This relationship was particularily apparent at the lower income levels. When incomes were below $3,000, measures of both aptitude and achievement were excessively low. While these Detroit children may not have been typical of all youth, the findings are supported by the work of Epstien[14]. She has shown that a similar condition exists for the United States population as a whole, but with a smaller relationship between income and ability as measured by placement tests. Little effort has been made to define this relationship for farm people and their children.

The problem of establishment in the farm business and the success of that establishment must hinge in part on the combination of resources which the beginning farmer can invest. The literature leaves unanswered the question of the most profitable combination of resources to lead toward successful farm operation. Neither does it define the effect that success or failure in the farm business may have upon the achievement of farm children. It is these unanswered queries which prompt this investigation.

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[13] Sexton, P.C., Education and Income, (New York: Viking Press, 1961) p. 298.

[14] Epstein, Lenore A., Effects of Low Income on Children, Social Security Bulletin, February, 1961.

CHAPTER III

DESIGN OF THE STUDY

Nature of the Design

The purpose of the study was well defined. The major task which remained was to identify a group of farmers who could be studied in detail. To test the adaptability of a sample group to the purposes of the study, four criteria for a suitable sample were established.

(1) The subjects must have entered the farm business at approximately the same chronological time.

(2) Subjects who entered the farming occupation must have been currently so engaged.

(3) Subjects had to have available accurate accounts of agricultural resources at the time of occupation entry.

(4) Measures of the educational input must have been readily available.

The need for refinement in selection of the sample group became more apparent when some of the extraneous factors which may have affected farm business income and success were examined. Tremendous changes had taken place from year to year in the technological innovations available to farm operators. It was evident that subjects to be studied must have had similar opportunities to utilize technical knowledge and skills; thus the requirement that the subjects enter the farming occupation at approximately the same time.

The cyclical nature of farm prices was another important consideration in subject selection. The agricultural market had not been noted for stability. Periods of high prices were generally followed by a corresponding period of low prices as farmers in aggregate adjusted production to capitalize on more favorable market situations. It was the intent of this study to select farmers who had begun farming at about the same period in the price cycle, thus minimizing the effects of the farm price cycle on success.

If these criteria for selection were valid, the question that remained was "Where does this population exist in a form which can be readily sampled?" Acquaintance with past agricultural programs pointed to two general groups of young men who had begun farming within the past twenty years.

The most recent of these groups, veterans of the Korean conflict, who were trained as farm operators under Public Law 550 and Public Law 894, were eliminated on two general counts. The first consideration was group size. Although the total number in training as farm operators appeared at first glance large, the number of veterans who remained in farming was considered too small to provide an adequate sample.

A more important consideration, however, in summary elimination of the potential study group, was the relatively short time they had been engaged in the farm business. Because the first enrollees did not begin farming until 1953, and the last not until 1958 they had not been established in the farm business long enough to allow an effective measure of their success.

A close examination of the group of men who began farming under the auspices of Public Law 346 and Public Law 16, revealed a group which more closly met the criteria previously outlined.

A large number of men (approximately 12,000 in Minnesota alone) were enrolled at various times in institutional on-the-farm training. Even considering the relatively large numbers which changed occupations after receiving training, the number still engaged in farming was adequate.

The majority of the men began farming between the years 1947 and 1950, thus providing a minimum of 15 years in which to become well established in the farm business.

The third and fourth criteria were also satisfied by this group. Each veteran trainee had to keep accurate, supervised farm accounts which provided a source for obtaining resource input information at the time the farm business was first organized. In addition, veteran service records contained some of the measures of the educational component which was being studied.

It should be understood that this was not a study of the veterans institutional on-the-farm training program. The veterans group was selected merely as a convenient vehicle for the study.

Selecting the Variable Factors

Because the concern was with the relationship of the education component to income, the measurable factors of the education component were considered first. The most common measure used is the highest school grade completed. For this study the months of on-the-farm agricultural instruction and participation in adult education were included as added measures of the education component. Considered important also, was a measure of general intelligence and mechanical aptitude.

The part played by the socio-biological status of the beginning farmer was uncertain. To ascertain the relationship of two of these factors to success in the farm business, the measures of age and marital status at the time of entry into the farming occupation were considered.

The factors which remained were primarily agricultural. It was important to consider the financial aspects of the farm business and some of the financial interrelationships considered to be of importance to the beginning farmer. The measures of investment in physical capital, ratio of fixed capital to total capital, ratio of net worth to debt, and ratio of training costs to total capital investment were considered adequate to define the farmers initial investment in capital resources on the farm.

Other measures of the status of the farm business were size of business as measured in work units, size of business as measured in tillable acres, and the tenure status of the farm operator.

The other principal questions which arose were:

(1) What measures should be used of income and success

in the farm business?

(2) What factors during the interim from beginning farming until the present should be considered as variables which may have had effect on the success of the business?

The measures of income selected were gross farm income as defined by the Internal Revenue Service (with an adjustment for capital gains) and net farm income as defined in a like manner.

Because of the instability of individual farm incomes from year to year, a better measure of long term success was sought. Gain in net worth was selected as a measure best reflecting the long-term success of the farm business as well as a measure of the relative average income level of each of the farm subjects. A refinement of the measure to reflect the gain in net worth per year farmed was finally selected as the third measure of farm success.

The additional variables which may have been related to farm income and success were more elusive. It was not possible to imagine a measuring device which would record and quantify the value of such individual causative agents as crop failures or disease or family disaster (or fortune) and their probable effect upon the chosen measures of farm success. There remained only one measure, other than the educational component previously alluded to, which held promise of a causal effect. The number of children that the family produced was chosen as this last measurable factor.

To study the achievement and aptitude of farm children in relation to their parents income, the Iowa Tests of Basic Skills and the Lorge-Thorndike Intelligence Test were chosen as measures of these attributes. The frequency with which these tests were reported from participating schools as well as their adaptability to the analysis influenced the selection of these specific measures.

More precise descriptions of the variables employed are presented in the following chapter.

Data Collection

Collecting data from the training centers which offered institutional on-the-farm instruction was begun by first selecting thirty schools which were listed by the Minnesota State Department of Education, Vocational Agriculture Section, as Veteran Training Centers.

The initial form (infra 116) with a covering letter (infra 117) was sent to each of thirty schools to determine if veterans training records were still on file and if the information needed could be located in the records.

When the availability of training records had been determined from each of these schools, the records were collected and transported to the University of Minnesota, Agriculture Education Department, where the data on the status of the veteran during the beginning of his farming career were collected. The beginning training information sheet (infra 118) was used for this first and subsequent data collection effort. Eighteen of the thirty schools had records available.

Locating the present address of each of the veterans was handled through two agencies. A list of the veterans who had been trained was sent to the respective veteran training center (Vocational Agricultural Departments) from which the records had been collected. Vocational agriculture instructors were asked to indicate the address and occupation of each trainee (infra 119).

The names on those who were listed as "unknown" by the vocational agriculture instructors were sent to the Agricultural Stabilization Committee office manager in each of the counties surrounding the training school (infra 120). Although every county A.S.C. manager queried responded promptly, very few additional veterans were located by that method.

A simple form letter was sent in the interim to all of the other schools which served as training centers in the veterans' training program and still maintained a vocational agriculture department to determine the availability of other veterans' records (infra 121). From this effort, an additional twenty-seven schools were found to have records available. Three schools would not permit removal of the records for data collection and the files from two schools were found to contain only records of veterans from the Korean conflict (PL 550 and PL 894). All of the other records were moved to the University Campus where the beginning farming data was transcribed to the data sheets.

The same procedure was used to locate the current address of these veterans as previously described except the use of the A.S.C. county manager was discontinued because of the very limited amount of additional information gained in this manner compared to the time and effort required for him to comply with the request.

When the best address available was known for each veteran, a questionnaire was developed to record current farm information. The questionnaire and covering letter (*infra* 122) were mailed to all of the veterans trained at one of the schools to determine the feasibility of a mail survey. After a lapse of two weeks, seventeen of the veterans in that area were interviewed using the same questionnaire to correct those sections of the instrument which were subject to incorrect interpretation. Minor changes were required in the second page of the instrument.

A revised questionnaire (*infra* 123) and letter were mailed to all of the veterans who were reported as farming from the other schools. When the initial questionnaire was not returned by the veteran or by the Post Office because of a faulty address, a second request for the completion of the questionnaire was mailed (*infra* 125). This same procedure was followed for all of the veterans in the project.

The response from the mailed questionnaire varied considerably. In schools with nine or more records delivered, the response varied from a low 16 per cent to a high 50 per cent of the surveys delivered by the post office. Not all of the total responses were usable, however. A number of veterans responded with incomplete information. Some indicated they were no longer engaged in farming. Some responded simply to say they would not cooperate. Of the first 233 returned, fifty seven were in the three categories described above.

Those who did not respond were placed on a list for later assignment to a vocational agriculture instructor for interview. This procedure resulted in an additional one hundred and sixty-five completed questionnaires returned. Some interviewers were more successful than others in persuading the farmer to reveal data from his federal income tax return which was essential to the study.

Of the total responses received, fifty-seven were incomplete. Some were simply missing portions of the data while others were returned completely blank with an explanation of why the farmer refused to complete the questionnaire. An additional sixty-four veterans returned the questionnaire but indicated they were no longer farming.

A fairly large number were returned by the post office because the addressee was unknown. Subsequent assignment for interview of the non-respondents to the mailed questionnaire indicated that a larger proportion of the total sample fell in that category than was indicated by the postal returns of undelivered letters. Interviewers indicated a fairly high number of their assigned veterans as being unknown at the address given. No attempt was made to trace those who were so listed either by the postal department or the interviewers. Although the occupation and address of all of the initial addressees was not determined, it is estimated that a larger number were non-farm than the returned questionnaires suggested.

The number of records delivered to veterans, and the number of completed returns received is recorded in Table I (_infra_ 31).

Questionnaires were mailed to the best available addresses of 1,639 veteran trainees. The U.S. Post Office Department returned one hundred and thirty-three as non-deliverable, leaving 1,506 surveys assumed delivered. Veterans returned three hundred and eighty-eight surveys of which fifty-seven were incomplete. Another sixty-four returned the survey to indicate they were no longer farming.

Subsequent assignment of non-respondents to vocational agriculture instructors for interview showed that only 90.6 per cent of those assumed to be farming were still engaged in the farm business. If this statistic is applied to the 1,442 who remained on the mailing list as assumed to be farming, the number of actual farmers is further reduced to an estimated 1,307. The return of three hundred and eighty-eight surveys from this sample of 1,307 was a return of 29.7 per cent.

A large number of the non-respondents (738) were assigned to teachers of vocational agriculture for interview. The veterans to be interviewed were chosen by assigning to the vocational agriculture instructors all of the veterans whose address indicated they lived within the service area of a town which had a department of vocational agriculture. Interview assignments were made by personal contact of each of the men involved. Seventy-three vocational agriculture instructors from sixty-three schools were given interview assignments. Although some teachers failed to make an effort to complete the interviews within the three-month period alloted, forty-one teachers from forty schools did complete at least one interview which produced a usable return. Other teachers interviewed the men assigned, but found them unwilling to supply the information requested. Vocational agricultural teachers completed one hundred and sixty-five interviews which resulted in complete questionnaires. In addition, thirty-three questionnaires were completed by interviews conducted by Agricultural Education Department personnel.

Data collection for the variables G.C.T. score and M.A.T. score was done with cooperation of the personnel of the Reference Service Branch of the Military Personnel Records Center, St. Louis, Missouri. As farm data were collected on each veteran trainee, a 3" x 5" card listing the veterans full name, service number and claim number was prepared. These cards, with a space for recording G.C.T. and M.A.T. scores were sent to the Military Personnel Records Center for completion.

The desired information was not available for every veteran. Of the five hundred and twenty nine names submitted for records research, G.C.T. scores were available on two hundred and ten. Even fewer records contained M.A.T. scores. While one hundred and eighteen M.A.T. scores were available, only one hundred and sixteen records also had G.C.T. scores.

As a result of the availability of G.C.T. and M.A.T. scores, sub-samples of two hundred and ten veterans with G.C.T. scores and one hundred and sixteen veterans with both test scores utilized in the statistical analyses to maximize the use of available data on all subjects.

The measures of school achievement and aptitude were drawn from the records of schools which the farm children attended. As each veteran returned the questionnaire, the names, age, grade and school attended for each child were transferred to a data card. This card was patterned after the test record section of a cumulative record folder in common use, (infra 126).

The cards were mailed, along with an accompanying letter, to the respective schools. Only cards for children in grades four and above were prepared, since it uncommon for schools to conduct standardized testing programs below the grade four level with tests that would yield results which could be compared with children in the higher grades.

Response was obtained for six hundred and ten children, with the final selection of an appropriate intelligence test reducing the sample to the children from one hundred and forty-five families. Since the achievement test was limited to grades four through eight, only one hundred and twenty families were represented by this measure.

While almost all schools returned the data cards, many were incomplete. Several schools refused to submit information without individual parent approval. A fairly large number of schools were rural single teacher districts which did not follow a standardized testing program, and consequently had no information available.

TABLE I

SUMMARY OF SAMPLE PLAN AND DATA COLLECTION INFORMATION

1. Number of schools with training records available	45
2. Number of schools supplying training records for use in the study	40
3. Number of questionnaires mailed to veterans	1,639
4. Number of questionnaires returned by the Postal Department - Incorrect addresses	133
5. Net number of records assumed delivered to veterans	1,506
6. Number of veterans farming who returned the questionnaire	388
7. Number of veterans in non-farm occupations who returned the questionnaire	64
8. Number of respondents available for assignment for interview:	
Number assigned for interview	705
Teachers assigned to interview	73
Schools with teachers assigned	63
9. Number of teachers returning completed interviews	41
10. Number of interviews completed by Agricultural Education Department Staff	33
11. Number of interviews completed by Vocational Agricultural Instructors	165
12. Total number of usable records included in survey	529
13. Response from veterans whom it was assumed received a questionnaire	43.2%

Statistical Design

The technique employed in objective one of the study is referred to as multiple regression. Of importance to the validity of the statistical results of this technique is the conformity of the data to the assumptions which underly the procedure. The multiple regression procedure assumes that each of the variables is normally distributed and continuous. Although normality is assumed necessary if the statistic is to be the most efficient predictor, the use of large sample size as in this study allows wide departures from the normal distribution without invalidation of the statistic. The same assumptions apply to the multiple correlation procedure used later in judging the strength of the prediction.

Since there was no cause to assume that any of the variables were not within the acceptable limits of normality, no special tests were conducted to test the normal distribution of the variables. Likewise, all variables are considered to be measured as points on the continuous scale even though such measurement was taken to the nearest whole number.

Assessment of sub-sample homogeneity in this study was not a critical issue, since all sub-sample groups were used in separate analyses rather than in combination. While it is common for a variable to be discarded when it is found to be heterogeneous between sample groups, to have done so this instance would not have served any worthwhile purpose. Since discarding the variable does nothing to improve the true homogeneity of the samples, all variables were retained in this study even though the homogeneity of one variable between samples was subject to doubt. To generally assess the homogeneity of variables between samples and aid in explaining differences between sample groups each variable was subjected to an adaptation of the Fisher t Test.

The multiple regression equation is used for predicting the dependent variable (Y) from a set of independent variables (X_1, X_2, X_3 ... X_K). Although the formula may be expressed in several ways, a method used by Steele and Torrie expresses this relationship as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 \dots + \beta_i X_i \dots + \beta_K X_K + \epsilon$$

for a population and derives the formula:

$$\hat{Y} = a + b_1 X_1 + b_2 X_2 \dots + b_i X_i \dots b_K X_K$$

for predicting the value of Y from the sample estimates of the population parameters. The estimate of the parameter α is:

$$a = \overline{Y} - b_1 X_1 - b_2 X_2 - b_i X_i - b_K X_K .$$

The estimated value of β_i for each of the variables is solved by means of the solution of simultaneous equations. One equation must be solved for each of the independent variables employed. If a dozen independent variables are employed, than a dozen equations must be solved simultaneously. It is easy to see that the solution of the problem by this means, when many independent variables are employed is a very complicated task.

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[1] Steele, Robert G.C., James Torrie, Principles and Procedures of Statistics, McGraw Hill, 1960. p. 283.

The usual procedure, and that followed in this study, was to have such computations done by electronic equipment which employed the principals of matrix algebra to solve the equations and provide estimates of the population β for each of the independent variables. Either partial regression coefficients or partial correlation coefficients could have been used to test if a variable is making a significant contribution to the prediction of the dependent variable. The test used in this study utilizing the partial regression coefficient, is described in detail by Steele and Torrie[2]. In brief, the test utilized a _t_ statistic found by the ratio of the standard partial regression coefficient to the standard error of the partial regression coefficients. The formula appropriate for two independent variables is given below.

$$t = \frac{b'_{y\,1.2}}{S_b'}$$

$t \overset{d}{=} t$ (degrees of freedom appropriate for multiple correlation).

$$S_b' = \sqrt{\frac{1 - R^2_{Y\,.\,12}}{(1 - r^2_{12})(n - k)}}$$

n = number of multiple observations

k = number of independent variables

The notation could be readily expanded to include a greater number of independent variables. All computations of t values for this study were done with the aid of electronic computers using the UMSTAT 50 Program.

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[2] Ibid. p. 289.

Multiple correlation coefficients were obtained by utilizing the partial regression coefficients obtained by the regression technique described above. The value of this coefficient is found by the formula:

$$R_{Y_1} \cdot X_1 X_2 X_i \dots X_K = \sqrt{(b_{1_{YX_1}} \cdot b_{1_{X_1Y}}) + (b_{2_{YX_2}} \cdot b_{2_{X_2Y}}) + \dots \dots (b_{i_{YX_i}} \cdot b_{i_{X_iY}}) + (b_{K_{YX_K}} \cdot b_{K_{X_KY}})}$$

The square of the correlation coefficient, R_K^2 or R^2, is used as a measure of the efficiency with which the independent variables in combination serve as predictors of the dependent variable Y. This term when multiplied by one hundred is referred to as the coefficient of multiple determination. The value of this statistic can be interpreted in terms of the proportion of the total variation of the Y variable accounted for by variations in the independent or X variables.

Another way of viewing the strength of the proportion is to consider the value of $1 - R_K^2$ as the proportion of the total variation which would remain if the variation caused by the independent variables was controlled. It can readily be seen that a large R_K^2 value is desirable if an efficient prediction of the Y variable is to be obtained.

The values expressed for beta (β) for each independent variable as well as the value of R_K^2 are different for various combinations of X variables and for different criterion variables.

The analysis of variance technique can be utilized to test the significance of the multiple correlation coefficient. This test depends upon the ratio of the variance associated with regression to that not associated with regression. The ratio is expressed as:

$$F = \frac{\dfrac{R_K^2\ SS_Y}{K}}{\dfrac{1 - R_K^2\ SS_Y}{N - K - 1}}$$

The F in this instance is distributed as F with K, N - K - 1 degrees of freedom. The complete table for completing this ratio follows:

Test For Significance Of R^2

Source of Variation	Degrees of Freedom	Sums of Squares	Mean Square	F
Associated with Regression	K	$R^2\ (Y-\bar{Y})^2$	$\frac{R^2\ (Y-\bar{Y})^2}{K}$	$\frac{\text{M.S. Regression}}{\text{M.S. Not Regression}}$
Not Associated With Regression	N - K - 1	$(1-R^2)(Y-\bar{Y})^2$	$\frac{(1-R^2(Y-\bar{Y})^2}{N - K - 1}$	
Total	N - 1	$(Y - \bar{Y})^2$		

The analysis of the covariance is also employed in this study. This technique can be properly employed when there is speculation that the criterion variable under consideration is subject to reaction to independent variables other than the one or ones under direct study. The analysis of covariance procedure mathematically controls with a system of weights for the effect of these covariates, and allows a measure of the difference in group means without respect to the effects of an extraneous variable.

A series of assumptions underlie the use of the analysis of covariance technique. They are:

(1) Populations are assumed to be normal, independently distributed, with σ^2 equal (but unknown) between populations.

(2) Subjects are randomly selected on all variables except the criterion variable.

(3) The covariate is unaffected by treatments.

(4) The regression of Y on X is linear and with the same β value for each population. This is the most vital of the assumptions listed.

The model for this analysis is:

$$Y_{ij} = \mu_{ij} + \alpha_i + \beta_W (W-\overline{W}) + \beta_X (X-\overline{X}) \ldots \beta_Z (Z-\overline{Z}) + \epsilon_{ij}$$

As can be seen by this model, the analysis of the covariance is a combination of the analysis of variance model and multiple regression.

In the analysis of covariance, the criterion data are adjusted for the linear effects of each of the covariates through the use of a multiple regression equation. This equation has the form:

$$Y = b_{Y.W} (W_{ij} - \overline{W}_{i.}) + b_{Y.X} (X_{ij} - \overline{X}_{i.}) + b_{Y.Z} (Z_{ij} - \overline{Z}_{i.}) + \overline{Y}_{i.}$$

This multiple regression formula is incorporated in the analysis of multiple covariance as described in the following table. Only two covariates are shown in this table to conserve space and keep the illustration in more easily understood form. The procedure can be expanded to accomodate many more variables.

The table is presented in computational form to allow the reader to more easily follow the steps in the analysis procedure.

It can be seen in examination of the definitional form of SS_Y (adjusted), that the adjustment serves to reduce the sums of square terms associated with error ($SS_{S(A)}$) and the total sums of squares (SS_T) to those products which are not accounted for by the regression effects of X and Z on the variable Y.

The adjusted sums of squares for the main effect (SS_A) which is under study is then found by subtracting the adjusted error sums of squares from the total sums of squares.

The mean square and the F ratio to test the significance of the variation remaining between the means of the groups is computed using these adjusted mean squares. The appropriate degrees of freedom are given in the table.

The analysis of multiple covariance is used in this study only to further define the relationship of the variables of the educational component to the success of the farm business as measured by each of the three dependent variables. Although it would have been appropriate to study this relationship by means of multiple variable classification, it was not deemed necessary to devote attention to the interaction effects of such

TABLE II

ANALYSIS OF MULTIPLE COVARIANCE - TWO COVARIATES

Source of Variation	Degrees of Freedom	SSX	SSZ	SPXY	SPZY	SPXZ	SSY
A	I - 1	$\frac{\Sigma X_{i.}{}^2}{J} - \frac{X_{..}{}^2}{IJ}$	$\frac{\Sigma Z_{i.}{}^2}{J} - \frac{Z_{..}{}^2}{IJ}$	$\frac{\Sigma X_{i.} Y_{i.}}{J} - \frac{X_{..}Y_{..}}{IJ}$	$\frac{\Sigma Z_{i.} Y_{i.}}{J} - \frac{Z_{..}Y_{..}}{IJ}$	$\frac{\Sigma X_{i.} Z_{i.}}{J} - \frac{Z_{..}Y_{..}}{IJ}$	$\frac{\Sigma Y_{i.}{}^2}{J} - \frac{Y_{..}{}^2}{IJ}$
S (A)	IJ - i	$\Sigma\Sigma X_{ij}{}^2 - \frac{\Sigma X_{i.}{}^2}{J}$	$\Sigma\Sigma Z_{ij}{}^2 - \frac{\Sigma Z_{i.}{}^2}{J}$	$\Sigma\Sigma X_{ij} Y_{ij} - \frac{\Sigma X_{i.} Y_{i.}}{J}$	$\Sigma\Sigma Z_{ij} Y_{ij} - \frac{\Sigma Z_{i.} Y_{i.}}{J}$	$\Sigma\Sigma X_{ij} Z_{ij} - \frac{\Sigma X_i Z_i}{J}$	$\Sigma\Sigma Y_{ij}{}^2 - \frac{\Sigma Y_{i.}{}^2}{J}$
TOTAL	IJ - 1	$\Sigma\Sigma X_{ij}{}^2 - \frac{X_{..}{}^2}{IJ}$	$\Sigma\Sigma Z_{ij}{}^2 - \frac{Z_{..}{}^2}{IJ}$	$\Sigma\Sigma X_{ij} Y_{ij} - \frac{X_{..}Y_{..}}{IJ}$	$\Sigma\Sigma Z_{ij} Y_{ij} - \frac{Z_{..}Y_{..}}{IJ}$	$\Sigma\Sigma X_{ij} Z_{ij} - \frac{X_{..}Z_{..}}{IJ}$	$\Sigma\Sigma Y_{ij}{}^2 - \frac{Y_{..}{}^2}{IJ}$

Source of Variation	Degrees of Freedom	SSY Adjusted (Definitional Form)	MS Adjusted	*F
A	I - 1	$SS'Y_A = (SS'Y_T - SS'Y_{S(A)})$	$\frac{SSY_A \text{ adj.}}{I - 1}$	$\frac{MS_A \text{ (adj.)}}{MS_{S\ (A)} \text{ adj.}}$
S (A)	IJ - I - 2	$1 - R_K^2\ SSY_{S\ (A)} = SS'Y_{S\ (A)}$	$\frac{SSY_{S\ (A)} \text{ adj.}}{IJ - I - 2}$	
TOTAL	IJ - 3	$1 - R_K^2\ SSY_T = SS'Y_T$		

$*F \overset{d}{=} F\ (I - 1)\ (IJ - I - 2)$ degrees of freedom.

an analysis. The variables of the educational component had been previously employed in the multiple regression equation to aid in the prediction of the criterion variable. The analysis of multiple covariance permitted the independent study of each of the variables of the education component without regard to the social and economic factors which also had some bearing on farm success.

To study the relationship of the farm income criterion measures to achievement and aptitude of farm children required only the use of the Pearson's Product Moment Correlation. The percentile rank of the composite score for each child on the Iowa Tests of Basic Skills expressed as a normalized T score, was correlated with the criterion measures of gross income, net income and yearly gain in net worth.

The same correlation procedure was followed to study the relationship of income to childrens' aptitudes. The aptitude scores on the Lorge-Thorndike Intelligence Test were correlated with each of the measures of farm income.

Measuring the Factors

Almost all of the factors used in this study were measured directly from the data collected. Because the factors deal in absolute terms such as dollars, years and size, for example, little thought was given in arriving at a precise unit of measurement.

Some mathematical computation was necessary to arrive at the ratios used as variable factors and the variable called size of business - work units. While ratios were simple excercises in long division, computing farm business size in work units required the application of weighting factors to the farm information on crops and livestock. The weighting factors were those used by the Department of Agricultural Economics, University of Minnesota for the farm records analysed, for the various farm management services for the calendar year 1948.

Because the weighting factors changed from 1949 to 1965, a farm business expressed as 300 work units in 1948, would today with a similar scope in livestock and crop interprises, be computed at less than 300 work units due to general increases in farm efficiency during that time.

One factor of the education component, intelligence, was obtained from military records on file with the Military Personnel Records Center, St. Louis, Missouri. The General Classification Test was used to measure this factor. The Mechanical Aptitude Test was used as a measure of the non-verbal mechanical aptitudes of beginning farmers. Other measures of the educational component were obtained either from the veteran's training file or subsequent questionnaires.

Data dealing with aptitude and achievement of children were collected by standardized tests previously administered by local schools. Measures of the achievement level and aptitude were the percentile rank and standardized scores respectively, for tests designed to measure those attributes.

CHAPTER IV

DEFINITION OF TERMS AND CONCEPTS

Although most of the terms in this study need no definition because of their common connotations, for purposes of clarity many of the terms and variables are defined, herein.

A. Farm veteran, or veteran trainee, refers to men who served in one of the several armed services during World War II and upon discharge entered institutional on-the-farm training under the auspices of PL 346, PL 377 or PL 16 of 1943-44. These programs were offered in over 130 public schools in Minnesota alone, and served an estimated 12,000 veteran trainees.

B. Beginning farmer. The definition of beginning farmer is not precise, since for many it was difficult to establish a time of beginning. In this study the term refered to those men who were engaged in farming as the primary source of income from productive labor. They may have been owners, renters or partners in a farm business, but were considered to have been established for only a short period of time.

C. Educational component. The educational component consisted of five separate measures. They were:

   1. Years of school completed measured to the nearest whole year.

2. Participation in adult education or post-secondary education measured as the number of special organized meetings attended during the five year period from 1959 to 1964.

3. Number of months of veteran training completed. This information was taken from the veteran's training program file and recorded to the nearest month.

4. The intelligence of the veteran. The standard score obtained on the Army General Classification Test taken at the time entry into the armed service was used as an indirect measure of this attribute.

5. Mechanical aptitude. The standard score obtained on the Mechanical Aptitude Test taken at the time of entry into the armed service was used as an indirect measure of this attribute.

D. Investment in physical capital included the veteran's investment in land, buildings, livestock, crops and feeds, machinery and equipment and personal assets such as cash in the bank, stocks and bonds and other miscellaneous personal account items.

E. Ratio of fixed capital to total capital was a simple division of the value of land and buildings by the total investment in physical capital.

F. Net worth. The classical economic definition was used. Net worth was equal to total assets minus total liabilities.

G. The ratio of net worth to debt or total liability was the result of the division of net worth by total liabilities.

H. The ratio of total capital investment to training costs presented an assumption and a computation. It was not possible to determine the direct costs of each school for the training of the veterans enrolled. A flat rate of twenty-five dollars per month was determined as being representative of each school's training costs and within the limits specified by the training laws. The subsistance allowance paid each veteran was not considered part of the direct training costs. The ratio was computed as the result of the months of training completed times the flat rate of twenty-five dollars per month divided by the veteran's investment in physical capital.

I. Size of business was measured in units referred to as work units. A work unit was considered as the amount of work which the average man could accomplish is one ten-hour day. For example, a dairy cow during the period of this study was thought to require about one hundred and forty hours of time for proper care and management. Each dairy cow was then assigned a value of fourteen work units (one hundred and forty divided by ten hours). Other crop and livestock enterprises were similarly assigned values. The sum of all the work units on the farm was referred to as the size of business in terms of work units. A table of the values for various crop and livestock enterprises may be found in Appendix A. The degree of employment of the veteran trainees can be readily judged if it is remembered that a farm business size of about three hundred work units is considered a full-time employment opportunity.

J. Tillable acres counted only acres which were normally used to produce domestic crops and which could be tilled with normal tillage implements. This measure, rather than total acres was selected because of the wide variation in the per cent of farm land that is tillable in different parts of the state. It was assumed to be a more accurate measure of production potential than were total acres.

K. Tenure status was defined as four distinct categories of farm operation and occupancy.

1. Renter included one or several types of rental arrangements ranging from the simple cash rent lease to the more complex livestock-crop-share arrangements.
2. Partnership may or may not have involved investment in the capital assets of the farm, but did imply that the labor load was shared by another. Many beginning agreements between father and son could have been classed as partnerships, where both contributed to the labor supply, both contributed to the physical investment, both shared in the management decisions and shared in the produce of the farm according to the terms of their agreement.
3. Part owners were those who owned some land but rent-

ed additional portions of land.

4. Owners were those who were in the process of gaining or had already gained title to their real property through means of purchase agreement, or title transfer.

L. Gross income was definitive of a more elusive concept, in that what was defined was not truly a gross figure in the general sense. The term included the total income from the sale of all farm products and livestock and other assets, except those animals and other assets which the Internal Revenue Service classified as eligible for capital gains and those animals which were sold after having been purchased for the express purpose of resale. In the later case, only the difference between resale and purchase cost was included in the gross income figure.

Additions were made to compensate for the full value of the items classified as capital gain items. The value of the short term capital gain and the value of the long term capital gain were added to the reported gross income as determined by Internal Revenue Service computation. This combined and expanded figure was referred to as gross income.

M. Net farm income was computed by subtracting the allowable Internal Revenue Service deductions for farm expenses from the reported gross income and making the additions for capital asset items as indicated for gross income.

Both gross income and net income as defined for this study were collected for the calendar year 1963 from the income tax reports filed by the respondents.

N. Gain in net worth per year farmed was computed by subtracting the net worth at the beginning of the training period from the net worth obtained by analysis of the capital structure as of January 1, 1965, and dividing the answer by the number of years farmed. The net worth computation for January 1, 1965, was made from the assets and liabilities reported on the questionnaire. Total assets were computed as (a) Value of land and buildings plus (b) value of non-farm assets plus (c) value of livestock on hand January 1, 1965, plus (d) value of crop seed and feed on hand January 1, 1965, plus (e) value of machinery and equipment. The value for (e) was computed by subtracting the depreciation claimed on buildings, livestock and first-year special 20 per cent depreciation provision from the total depreciation charged, and multiplying the remainder by ten. It was assumed that the common practice of assigning an average useful life of ten years on farm equipment was followed by the respondents. Total liabilities included the indebtedness listed as real estate, personal property, and other liability. Net worth was equal to total assets minus total liabilities.

O. The number of children was obtained from the questionnaire and included children of all ages.

Note that with the exception of the terms gross income and net income, the definitions do not deviate a great deal from those generally accepted. Other terms which may be peculiar to this study will be defined in the context of the section in which they appear.

CHAPTER V

BIOGRPHICAL, ECONOMIC AND EDUCATIONAL FACTORS RELATED TO FARM INCOME

For better understanding of the sample for this study, the educational, economic and biographical characteristics of the 528** institutional on-the-farm trainees are briefly described at the time of entry into the farm business. While many of the factors used in description are subsequently used in defining the relationship to farm income, they are introduced here to provide a more exact description of the typical beginning farm operator with which this study deals.

Biographical

The average age of the farmer in this sample at the beginning of training was about thirty years. Because much counseling on occupational choice and prediction of success in a chosen occupation is made at an earlier age, this distinction is important. Some measure of the maturity of the trainees is suggested by the fact that about 70 per cent were married at this time and many had young families. Although the source of data was inadequate to provide precise measures of family size it was estimated that three hundred and seventy married veterans already had a total

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** While sample size is listed as 529 in other sections of this report, it was necessary to subsequently discard one farm because of incomplete data.

of four hundred and sixty children when they began farming.

Economic

By far the greatest attention has been focused on the economic resources of the beginning farmer. Economic resources are described here both in terms of physical farm size and capital investment.

Beginning farmers operated farms which averaged two hundred three acres in size with one hundred forty-four acres tillable. In terms of work units, farm size averaged three hundred thirty-six work units based upon the 1948 work unit calculation shown in Appendix A. Since farm size in acres and work units did not reflect those resources on a per man basis it was of interest to look briefly at the tenure status of the beginning operator, to gain some insight of the labor supply. About 53 per cent of the beginning operators were on some form of lease or rental agreement, 7 per cent listed themselves as partners, 9 per cent as part owners and 31 per cent as owners. Although this was not conclusive evidence of the singularity of manpower on these farms, it did suggest that except for the partnership farms, the others were, in the main, solely dependent upon operator and family labor.

Capital investment is usually conceived in terms of the broad categories of fixed and working capital. All men listed as renters and thirty of those listed as partners, had no fixed farm capital investments. The remaining partners, part owners and owners reported an average of $9,235 in this category. For the group in total, including all renters and partners, this investment was only $3,795 per farm. The ratio of fixed capital investment to total beginning capital was .21. The principal capital investment was in working assets, with $8,650 of the total capital investment of $12,445 utilized in that category.

A more direct measure of each beginning farmer's personal investment in the farm business was his net worth. The average net worth of this group was $8,975. The total liabilities were equal to $4,471 or about the same as the investment in fixed capital. It was interesting to note that about one-fourth of those beginning had no liability for either fixed or working capital.

Educational

Little is known of the intelligence level of the sample subjects except from tests of intelligence and mechanical aptitude given when the subject entered the armed services. The group averaged a score of only eighty-nine on the Armed Forces General Classification Test. Since this intelligence test has a mean of one hundred and a standard deviation of twenty, it indicated the group was slightly below average on this measure.

Figure 1 presents the distribution of G.C.T. scores in a percentage frequency polygon. There is a bi-modal distribution with scores concentrated at the mean and again about two standard deviations below the mean. Of sgnificance was the inequality of distribution of scores about the standard mean. While 29.3 per cent of the cases fell above one-half standard deviation above the standard mean, 42.2 per cent fell below one-half standard deviation below the standard mean. The complete lack of scores in the upper ranges of possible G.C.T. scores, compared to the normal or above normal distribution in the lower ranges, suggested that this study deals with a selected group of men from only a portion of the G.C.T. scale. This selection reduced the possibility of high correlation between this measure and farm success, and in this study tends to limit the usefullness of the G.C.T. score in the prediction equation.

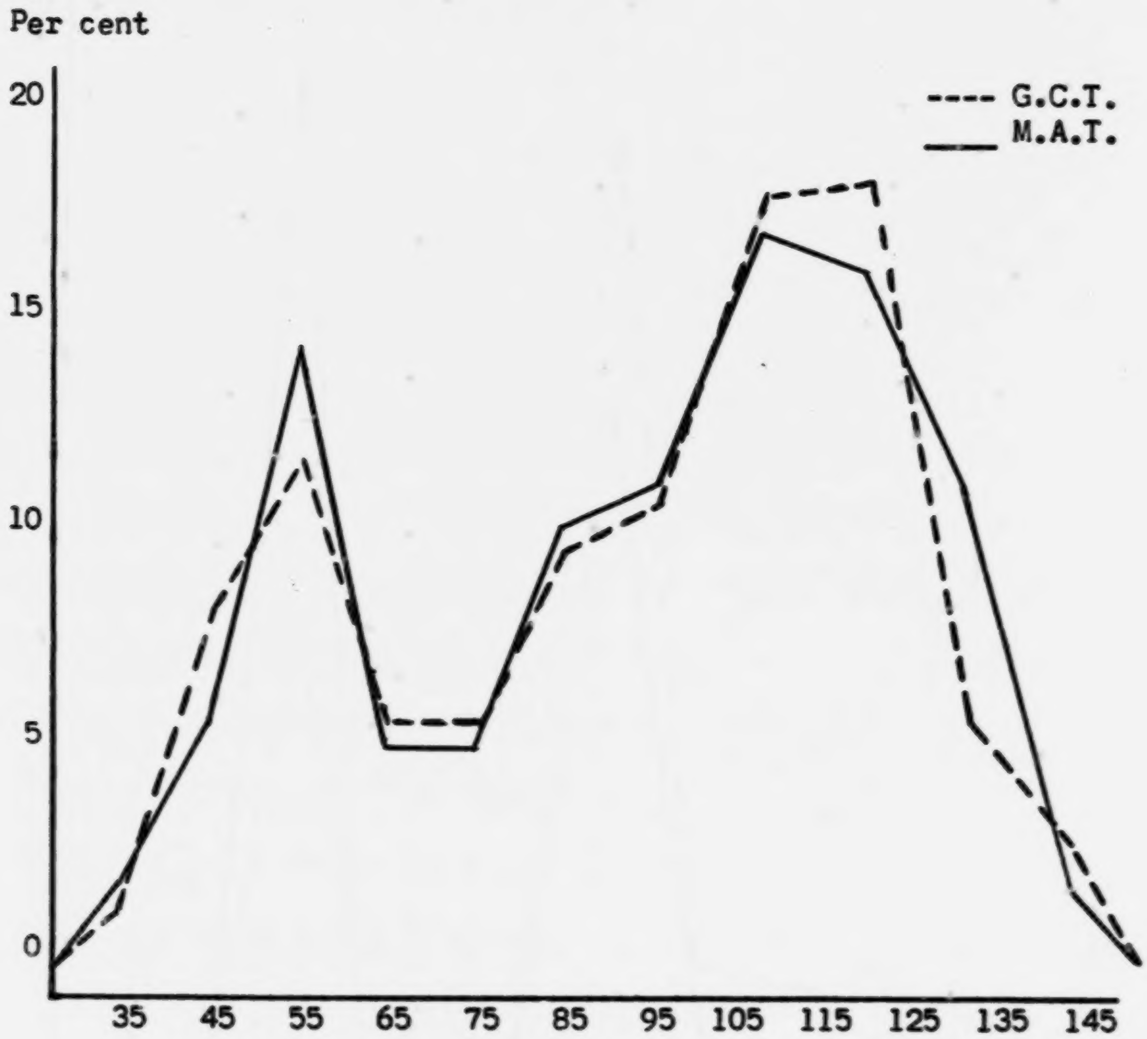

FIGURE I

Percentage Frequency Polygon
M.A.T. and G.C.T. Scores

M.A.T.: N=116 G.C.T.: N=210

Scores of the Mechanical Aptitude Test administered upon service entrance were similar, with a mean score of only eighty-nine. There is a marked similarity between the distribution of G.C.T. and M.A.T. scores. The lack of scores in the upper ranges of the possible score scale imposes the same limitation on the use of this variable as a predictor of farm success as was suggested for G.C.T.

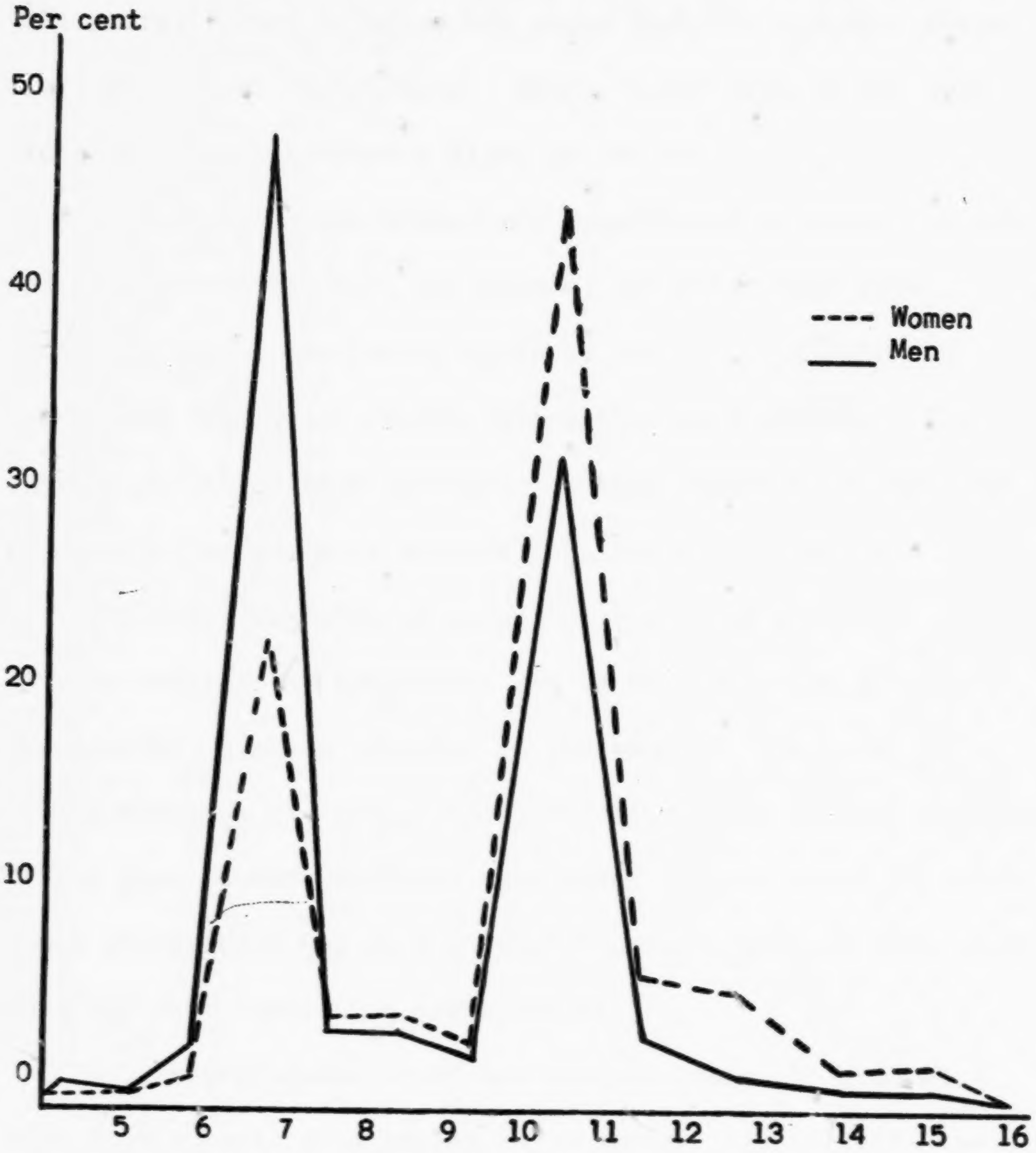

FIGURE 2

Percentage Frequency Polygon of Distribution
Of Highest School Grade Completed - Men and Women

Men: N=528 Women: N=501

Although these tests of intelligence and mechanical aptitude are only indicators of the true level of these attributes, it is assumed that this sample group ranked slightly below the national average in both of these attributes.

The average subject had completed 9.76 years of school. Averages in this instance, however, did not accurately describe the subjects. While the mean grade level computed at 9.76 years, Figure 2 (supra 52) shows that the variable grade level was almost dichotomous. About 87 per cent of the subjects fell in either grade eight or twelve.

The extremely low number who dropped out of school at the end of grades nine, ten, and eleven, indicated that once secondary school was begun, subjects usually terminated in graduation from grade twelve rather than as a dropout. The extreme deviation from normality of this variable, as well as the paucity of subjects with college training poses some limitation on this variable as a predictor of farm success.

An interesting comparison can be made with the wives of the married veterans included in the sample. The level of school attained was almost the complete reverse of that attained by the men. Women completed an average of 11.3 years of school. About 23 per cent had only an eighth grade education with about 45.5 per cent completing grade twelve.

Only eighty-three, or 48 per cent, of those who graduated from high school had enrolled in vocational agricultural training. All subjects had received post-high school vocational agricultural training, however, through the institutional on-farm training provisions of PL 16 and PL 346. The average subject attended thirty-eight months of this training .

Current Status

It is sometimes helpful to be able to visualize the changes that have taken place in a sample during the time covered by a study. To aid in that visualization, Table III presents the beginning farming and current status of the subjects in a number of selected factors.

TABLE III

BEGINNING OF TRAINING AND CURRENT STATUS OF SELECTED SAMPLE CHARACTERISTICS

Character or Factor	Beginning of Training	Current Status
Average age in years	29.9	45.8
Average number of children	.87	3.67
Tenure status - per cent of total		
Renters	53%	15%
Partners	7%	5%
Part Owners	9%	29%
Owners	31%	51%
Total fixed capital	$ 3,795	$29,589
Total capital	$12,445	$56,282
Total liability	$ 3,470	$14,382
Net worth	$ 8,975	$41,900
Size of farm - total acres	204	289
Size of farm - acres tillable	144	223
Size of business - work units	336	372

A striking contrast is the change in tenure status which has occured as more of the sample farmers moved toward farm ownership, and the vast increase in farm capital investment. Although farm size as measured in work units increased only 10 per cent, and increased only 42 per cent when measured in total acres, the amount of capital invested increased to 450 per cent of the beginning farming level.

Sample Group Homogeneity

Although the total sample consisted of five hundred twenty-eight subjects, information for the variables G.C.T. score and M.A.T. score was available for only two hundred ten and one hundred sixteen subjects, respectively. The data was grouped into three samples. The first contained all five hundred and twenty-eight subjects. The second group was a sub-sample of the first and contained two hundred ten subjects with G.C.T. scores. The third was again a sub-sample of the first containing only one hundred and sixteen subjects, but information on all of the variables studied including G.C.T. and M.A.T. scores.

To maximize use of the data, it was desirable to utilize each of the sample groups in a regression analysis, adding information for the additional available variable as sample size decreased. Since neither sub-sample was a random selection from the original sample, it was necessary to examine the three sample groups to determine if they were relatively homogeneous.

A simple adaptation of the two sample _t_ tests was used to assess homogeneity of the sample groups for each variable. The large sample size made it possible to assume that the variances of the three samples were equal. This assumption was supported by the fact that the ratio of the maximum variance to the minimum variance did not exceed 4.0 for any variable, and was less than 2.0 for seventeen of the nineteen variables tested[1].

The formula used to assess homogeneity of the means is as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2)}{\sqrt{\frac{N_1 - 1\,(S_1^2) + N_2 - 1\,(S_2^2)}{N_1 + N_2 - 2}\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

$$t \overset{d}{=} t\,(N_1 + N_2 - 2\text{ df})$$

$\bar{X}_1$ = largest mean

$\bar{X}_2$ = smallest mean

S_1^2 = unbiased estimator of σ_1^2 for the group with the largest mean.

S_2^2 = unbiased estimator of σ_2^2 for the group with the smallest mean.

The t values obtained by this method, as well as the mean and standard deviation of each of the eighteen variables are shown in Table IV. While Cochran and Cox[2] point out the inability to attach a significance level to this test, they indicate that the test is more rigorous for testing homogeneity than the table values indicate. They claim that the t values obtained by the method just described, when three means are compared, will exceed the table value which corresponds to the .05

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[1] Hayes, William H., Statistics for Pychologists, (Holt, Rinehart and Winston, 1963) p. 322.

[2] Cochran, W.G., and Gertrude Cox, Experimental Designs, (New York: Wiley and Sons, 1957) p. 74.

TABLE IV

HOMOGENEITY OF SAMPLE GROUPS: MEANS, STANDARD DEVIATIONS AND t VALUES FOR INDEPENDENT AND DEPENDENT VARIABLES

	Sample: N=528		Sub-Sample 1: N=210		Sub-Sample 2: N=116		t
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	
1. Age at beginning of training	29.925	5.007	28.052	4.192	27.457	3.975	5.078*
2. Beginning tenure status	2.178	1.360	1.995	1.303	1.991	1.261	1.359
3. Total capital (beginning)	12,445.390	9,641.752	11,342.910	9,189.843	11,085.340	8,418.180	1.406
4. G.C.T. score	---	---	89.128	26.575	89.095	25.671	.012
5. M.A.T. score	---	---	---	---	89.715	27.620	--
6. Size of business (work units)	336.223	159.851	321.833	150.853	319.853	155.246	1.011
7. Number of years as operator	15.807	1.494	15.924	1.462	15.810	1.426	.966
8. Months of I.O.F.T. completed	38.000	9.891	35.010	9.046	34.629	8.870	3.384*
9. Size of business (tillable acres)	144.271	94.755	146.371	89.231	150.138	96.097	.682
10. Number of children	3.670	2.419	3.738	2.473	3.638	2.232	.362
11. Highest school grade completed	9.763	2.154	9.976	2.142	10.103	2.232	1.979*
12. Years of high school Vo-Ag.	.396	1.029	.533	1.222	.586	1.299	1.715
13. Adult classes attended	6.973	15.253	8.633	17.410	9.966	20.506	1.851
14. Ratio:Total fixed cap./total beg. cap.	.210	.277	.179	.284	.184	.303	1.790
15. Ratio:Total beg. net wth./liabilities	2,171.688	4,852.795	2,234.914	4,477.936	2,645.653	5,063.517	.945
16. Ratio:Mo. of I.O.F.T. x 25/total cap.	.124	.112	.131	.121	.130	.123	2.373*
17. Gross income	13,385.510	10,083.800	13,862.470	9,396.050	14,713.490	10,553.780	1.300
18. Net income	2,710.608	4,852.795	2,234.915	4,477.936	2,645.653	5,063.517	.945
19. Gain in net worth/years	2,219.780	1,631.499	2.314.476	1,529.791	2,367.302	1,575.446	.887

* t values which exceed 1.96 are significant at the .13 level.

level of significance about 13 per cent of the time. Therefore, the .05 level in the t table is actually equivalent to the .13 level of significance.

Although four t values listed exceed the tabled .05 significance level, one would suspect that only the first, age of operator, may be significantly different among samples at the true .01 level. Since all samples will be used in the analyses which follow, the differences which exist will help to explain some of the differences in the relationship of variables to criterion measures between the various sample groups.

Factors Related to Gross Income

Predictive value of individual variables: Sixteen variables were utilized in multiple regression equations as predictors of the criterion variable, gross income. Because the independent variables G.C.T. scores and M.A.T. scores were not available except as indicated in the sub-samples, separate regression equations were developed for each of the sample groups. As would be expected, some of the sixteen predictive variables contributed little to the total prediction of gross income. Since the sample groups, while generally homogeneous, were not identical, some variation in predictability was expected between samples.

Tests of the partial correlation coefficients and the partial regression coefficients indicated that a number of the variables contributed significantly to the prediction of gross income in one or more of the regression equations. To aid in the selection of the variables to be retained in the regression formula, the following selection criteria were adopted. The significance of each variable was noted for each of the three regression equations at the .20 and .05 level of significance. A variable must have been significant at the .20 level in at least two equations or must have been significant in at least one equation at the .05 level to be retained. The t value was considered significant at the .05 level if it was less than -1.96 or greater than 1.96. The critical values for the .20 level of significance were -1.28 and +1.28.

Table V shows the significant t values for all variables in each equation and indicates those variables which were eliminated in later analyses. The variable M.A.T. score was retained, however, when significant at only the .20 level, since only one analysis used this variable in computation of the regression equation for gross income.

Those variables which did not meet the selection criterion outlined were summarily eliminated, and the data subjected again to multiple regression analysis. The results of the second analysis with the eleven variables selected by the process just described, are presented in Table VI. Those variables which were significant for each sub-sample are indicated.

When the total sample is considered, ignoring the Mechanical Aptitude Test scores, the most important variables for predicting gross income are, age at beginning of training, beginning tenure status, total beginning capital, size of beginning business - tillable acres, ratio of fixed/total capital, the number of adult classes attended, and number of years as a farm operator.

In addition, the variables M.A.T. Score and Ratio: Beginning net worth/total liabilities are significant in the smallest sub-sample.

It is significant that the variables for each of the categories, educational, economic and biographical, appear to be related to gross income.

Age at the beginning of training has a negative relationship. It implies that the younger one starts farming the greater his success. However, the fact that the average beginning age was 29.9 years suggests that the older farmers, at the time of this study may have been approaching retirement and were in the state of declining rather than increasing farm productivity.

Of greater interest is the significant relationship of the number of adult classes attended to gross income. With only a small number of men having participated in adult instruction, the significance of this factor in relation to gross income suggests it to be of high value. Only one hundred twenty-six of the five hundred twenty-eight subjects attended either farm management or other types of organized adult classes during the five years preceeding the study. The failure of this variable to rank as significant in the smaller sub-samples of two hundred ten and one hundred sixteen subjects may be due to the paucity of data rather than a lack of significance. The analysis of this variable presented in the next chapter defines the relationship in more detail.

TABLE V

FACTORS RELATED TO GROSS INCOME: t VALUES FOR TESTS OF SIGNIFICANCE OF PARTIAL REGRESSION COEFFICIENTS

Variable	Sample N=528	Sub-Sample 1 N=210	Sub-Sample 2 N=116	Variable Re-tained
Age at beginning of training	-3.537**	-2.462*	-2.046*	Yes
Beginning tenure status	-1.771	-3.112**	-2.918**	Yes
Total beginning capital	6.430**	4.328**	4.746**	Yes
Size of business - work units	-	-	-	No
Number of years as farm operator	2.147*	-	-	Yes
Months of I.O.F.T. completed	-	-	-	No
Size of business-tillable acres	2.847**	1.597	-	Yes
Number of children	-	1.421	-	No
Highest school grade completed	1.310	-	-1.511	Yes
Years of high school Vo-Ag.	-	1.410	1.584	Yes
G.C.T. score	xxx	-	-	No
M.A.T. score	xxx	xxx	2.510*	Yes
Ratio: $\frac{\text{Total fixed capital}}{\text{Total beginning capital}}$	-2.373*	-	-	Yes
Ratio: $\frac{\text{Beginning net worth}}{\text{Beginning total liability}}$	-1.291	-	2.060*	Yes
Number of adult classes attended	2.076*	-	-	Yes
Ratio: $\frac{\text{Months of I.O.F.T. x 25}}{\text{Total capital}}$	-1.736	-	-	No

** Variable significant at .01 level.

* Variable significant at .05 level. Those not marked are significant at .20 level. The dash lines indicate variables significant at greater than .20 level.

The economic factors of beginning tenure status, total beginning capital, size of business - tillable acres and ratio of total fixed capital to total beginning capital are all highly intercorrelated. The abbreviated intercorrelation table (Table VII) shows these relationships. All correlations shown are significantly different from zero at the .ol level of significance.

TABLE VI

FACTORS RELATED TO GROSS INCOME - SELECTED VARIABLES: t VALUES FOR TESTS OF SIGNIFICANCE OF PARTIAL REGRESSION COEFFICIENTS

Variable	Sample N=528	Sub-Sample 1 N=210	Sub-Sample 2 N=116
Age at beginning of training	-3.964**	-2.271*	-1.972*
Beginning tenure status	-1.804	-3.205*	-2.928**
Total beginning capital	8.434**	5.880**	5.177**
Number of years as farm operator	1.967*	.163	- .831
Size of business-tillable acres	3.686**	1.880	1.109
Highest school grade completed	1.446	- .518	-1.394
Years of high school Vo-Ag.	.656	1.785	1.567
M.A.T. score	xxx	xxx	-2.804**
Ratio: $\frac{\text{Total fixed capital}}{\text{Beginning total capital}}$	2.348*	- .139	- .415
Ratio: $\frac{\text{Beginning net worth}}{\text{Total beginning liability}}$	-1.160	-1.158	2.324*
Number of adult classes attended	2.285*	1.524	2.013*

* Indicates t value significant at .05 level.
** Indicates t value significant at .01 level.

While no single variable stands out as an efficient predictor of gross income, these variables, drawn from all three categories, when combined afford some prediction of farm success. All components necessary for devising a complete multiple regression formula for predicting gross income can be found in Table XXXV (infra 130).

TABLE VII

INTER-CORRELATIONS OF SELECTED ECONOMIC VARIABLES AND GROSS INCOME[1] N=528

	1	2	3	4	5
1. Beginning tenure status	1.000	.436**	- .281**	.787**	- .168**
2. Total beginning capital		1.000	.717**	.441**	.249**
3. Size of business-tillable acres			1.000	- .177**	- .312**
4. Ratio: $\frac{\text{Total fixed capital}}{\text{Total beginning capital}}$				1.000	- .137**
5. Gross Income					1.000

* Significant at the .ol level.

Predictive Value of Variables in Combination: The efficiency of the variables as predictors of the criterion measure "Gross Income" when all variables are considered simultaneously, can be best described by the coefficient of multiple correlation. The square of this coefficient provides a measure of the amount of the total variability of the criterion measure that can be explained by variations in the independent variables. Table VIII presents the multiple correlation coefficients and the square of these coefficients for each of the samples. Since the elimination of some variables from the analyses affects the R and R^2 values, they are shown both for the analyses which include all variables and the analyses which include only variables selected for the final regression equation.

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[1] The complete table of inter-correlations may be found in Appendix Table XLI, (Infra 136).

TABLE VIII

MULTIPLE CORRELATION COEFFICIENTS FOR GROSS INCOME REGRESSION ANALYSES

	N=528	N=210	N=116
Coefficients of correlation - All variables R:	.51105	.55604	.57144
Coefficient of correlation squared - All variables R^2:	.26117	.39818	.32654
Coefficient of correlation - Selected variables R:	.50267	.53375	.62049
Coefficients of correlation squared - Selected variables R^2:	.25268	.28489	.38501

A test of the multiple correlation coefficients proved each to be significantly different from zero at the .01 level. The formula used to test the significance of the multiple correlation coefficient was:

$$F = \frac{R^2}{1-R^2} \cdot \frac{N-K-1}{K}$$

$F \overset{d}{=} F\ (N-K-1,K)$ degrees of freedom

N = sample size

K = number of independent variables

While the R^2 values shown in Table VIII indicate the variables selected were not highly efficient predictors of gross income, nevertheless, they were accounting for approximately 30 per cent of the total variation in this criterion of farm success.

It is significant that reducing the number of predictive variables by five had little effect upon the R^2 values. This was additional evidence that the variables eliminated were adding little to the total prediction.

It can be concluded from examination of the R^2 values that a large part of the variation in the criterion, gross income, is not explained by variations in the variables retained. The study offers no clues to the cause of the remaining variation, except that the criterion measure represents only one year in the continuum of the farm business cycle. Should it have been possible to gather accurate measures of this criterion for the entire time span of the study, perhaps more accurate prediction would have been possible.

Factors Related to Net Income

Predictive Value of Individual Variables: While the majority of the variables seemed to have a significant relationship to gross income, such was not the case with net income. As shown in Table IX (infra 66) only five variables met the criteria for variable selection and were retained for further analyses.

Subsequent analyses of these selected variables by multiple regression produced the relationships shown in Table X,(infra 67).

TABLE IX

FACTORS RELATED TO NET INCOME: t VALUES FOR TESTS OF SIGNIFICANCE OF PARTIAL REGRESSION COEFFICIENTS

Variable	Sample N-528	Sub-Sample 1 N=210	Sub-Sample 2 N=116	Variable Retained
Age at beginning of training	-	-	-1.343	No
Beginning tenure status	-1.413	-1.667	-1.793	Yes
Total beginning capital	2.137*	1.699	4.506**	Yes
Size of business - work units	-1.454	-1.348	-2.437*	Yes
Number of years as farm operator	1.603	-	-	No
Months of I.O.F.T. completed	1.592	-	-	No
Size of business-tillable acres	-	-	-	No
Number of children	-	-	-	No
Highest school grade completed	8.146**	1.581	-	Yes
Years of high school Vo-Ag.	-	-	-	No
G.C.T. score	xxx	-	-	No
M.A.T. score	xxx	xxx	-	No
Ratio: Total fixed capital / Total beginning capital	1.672	-	-	No
Ratio: Beginning net worth / Beginning total liability	-	-	-	No
Number of adult classes attended	-	-	-	No
Ratio: Months of I.O.F.T. x 25 / Total capital	-2.180*	-1.326	-	Yes

** Variable significant at the .01 level.

* Variable significant at the .05 level. Those figures not marked are significant at the .20 level.

The case for predicting net income from the variables selected is not very strong. The measures of beginning tenure status, total beginning capital, and highest school grade completed all show a significant relationship to net income in the large sample. Farm business size is significant only in the small sub-sample. The strength of the relationship in total is so low, however, that the equation is an ineffective tool for making a prediction of this criterion. The inter-correlation coefficients for all variables used in the prediction of net income are given in Table XI.

TABLE X

FACTORS RELATED TO NET INCOME - SELECTED VARIABLES: t VALUES FOR TESTS OF SIGNIFICANCE OF PARTIAL REGRESSION COEFFICIENTS

Variable	Sample N=528	Sub-Sample 1 N=210	Sub-Sample 2 N=116
Beginning tenure status	-3.637**	-2.435*	-3.333**
Total beginning capital	2.163*	1.889	5.110*
Size of business - work units	- .982	-1.513	-3.475**
Highest school grade completed	3.175**	1.376	- .106
Ratio: $\frac{\text{Months of I.O.F.T. x 25}}{\text{Total beginning capital}}$	-1.543	- .914	- .449

* Indicates t value significant at .05 level.
** Indicates t value significant at .01 level.

No claim is made that farm success as measured in net income cannot be predicted, but rather to assert that the variables which permit this prediction have not been included in this study. Perhaps there were other variables, more subtle to discover and demanding of more precise measurement which played an important role in the size of farm net income.

While the inter-correlations of independent variables with each other is high in some cases, the correlations of these variables with net income is not. Table XI shows the correlation of all of the independent variables with net income to be low and in the case of total beginning capital and size of business - work units, to be not significantly different than zero.

TABLE XI

INTER-CORRELATIONS OF SELECTED VARIABLES AND NET INCOME[1] N=528

	1	2	3	4	5	6
1. Beginning tenure status		.44**	-.14**	-.13**	-.26**	-.18**
2. Total beginning capital			.24**	-.01	-.55**	.08
3. Size of business - work units				.15*	-.19**	.04
4. Highest school grade completed					.04	.16**
5. Ratio: $\frac{\text{Months of I.O.F.T. x 25}}{\text{Total beginning capital}}$						.10
6. Net Income						

* Indicates t value significant at the .05 level.
** Indicates t value significant at the .01 level.

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[1] The complete table may be found in Appendix Table XLI (infra 136).

An examination of net income as a criterion points to some of the less desirable attributes of this measure of success. As with gross income, a measure of net income over a longer time span would remove some of the fluctuations inherent to the farm business. There is a natural (and legal) tendancy to compress the true range of the net income variable. Those farmers who have large incomes utilize a variety of approved techniques to reduce the net income level and subsequent tax payment. Others whose income is small, are less concerned with reducing net income, and may in fact, manage the accounting system in such a way as to maximize the net income statement. These factors taken into account would suggest that net income was not a particularily good measure of farm success when the measure of net income was that reported for income tax purposes for a single year. A measure of average net income over a period of years, however, reduces the opportunities for manipulation and may be more subject to prediction by the variables in this study.

Predictive Value of Variables in Combination: The multiple correlation coefficients and their associated squared values are presented in Table XII for each multiple regression analysis in which net income was the criterion variable. Values for R and R^2 are given both where the analyses included all variables and where only those variables selected for the final regression analyses were retained.

While the multiple correlation coefficient is significantly different from zero, the value of this combination of variables as a predictor of net income is so low that they have little worth in predicting farm success measured in these units.

TABLE XII

MULTIPLE CORRELATION COEFFICIENTS FOR NET INCOME REGRESSION ANALYSES

	N=528	N=210	N=116
Coefficients of correlation - All variables: R=	.28058**	.28525**	.54129**
Coefficients of correlation squared - All variables: R^2=	.07872	.08137	.29300
Coefficients of correlation - Selected variables: R=	.23966**	.23382**	.50775**
Coefficients of correlation squared - Selected variables: R^2=	.05744	.05467	.25781

* Significant at the .05 level.
** Significant at the .01 level.

Factors Related to Yearly Gains in Net Worth

Predictive Value of Individual Variables: Neither gross income nor net income provides the only measures of success of the farm business. Often success is measured in terms of financial progress over a number of years. The most readily accepted measure of financial progress, and thus farm business success, is the yearly gain in net worth. Table XIII shows the relationship of each of the variables to this criterion.

The six variables retained because of their significant t values were subjected again to multiple regression analyses. The significance of each variable in this recombination is shown in Table XIV.

The variable classifications of biographical, educational and economic are represented by the four variables which bear a significant relationship to yearly gain in net worth per year. Age at beginning of training, representing the biographical classification, is again significant. Two variables, total beginning capital and size of business - tillable acres, reflect the economic input of the beginning farmer. The educational input is represented by the number of adult classes attended. The number of years as a farm operator, while significant in sub-sample 1, fails to register as significant in the large sample.

Predictive Value of Variables in Combination: As with the two previous criterion measures, prediction of the dependent variable is more efficient when the variables are considered in combination rather than separately. The efficiency of the variables as predictors of yearly gain in net worth when all variables are taken into account, and when only those variables used in the final regression equation are utilized as shown in Table XVI.

All multiple correlation coefficients in Table XVI (infra 74) proved to be significantly different from zero at the .05 level. While the R^2 values are not particularily high, they do suggest the ability to reduce the error in predicting farm success by considering the variables studied. Note that reducing the number of variables from fourteen to six only reduced the predictability of yearly gain in net worth, based on the whole sample, by 3 per cent.

TABLE XIII

FACTORS RELATED TO YEARLY GAIN IN NET WORTH: t VALUES FOR TESTS OF SIGNIFICANCE OF PARTIAL REGRESSION COEFFICIENTS

Variable	Sample N=528	Sub-Sample 1 N=210	Sub-Sample 2 N=116	Variable Re-tained
Age at the beginning of training	-2.805**	-2.499*	-2.230*	Yes
Beginning tenure status	-	-	-1.808	No
Total beginning capital	6.272**	3.980**	3.816**	Yes
Size of business - work units	1.307	-	-	No
Number of years as farm operator	2.139*	2.059*	-	Yes
Months of I.O.F.T. completed	-1.600	-	-	No
Size of business - tillable acres	3.200**	2.368*	1.364	Yes
Number of children - ending	1.613	-	-	No
Highest school grade completed	-	-	-	No
Years of high school Vo-Ag.	-	-	-	No
G.C.T. score	xxx	-	-	No
M.A.T. score	xxx	xxx	-1.341	Yes
Ratio: Total fixed capital / Total beginning capital	-	1.335	-	No
Ratio: Beginning net worth / Total liabilities	-	-	1.294	No
Ratio: Months of I.O.F.T. x 25 / Total capital	-	-	-	No
Number of adult classes attended	2.774**	-	-	Yes

* Indicates variable significant at the .05 level.
** Indicates variable significant at the .01 level.

Those not marked are significant at the .20 level.

TABLE XIV

FACTORS RELATED TO YEARLY GAIN IN NET WORTH - SELECTED VARIABLES. t VALUES FOR TESTS OF SIGNIFICANCE OF PARTIAL REGRESSION COEFFICIENTS

	Sample N=528	Sub-Sample 1 N=210	Sub-Sample 2 N=116
Age at beginning of training	-3.708**	-2.635**	-2.232**
Total beginning capital	6.125**	4.462**	3.905*
Number of years as farm operator	1.763	2.110*	.226
Size of business-tillable acres	5.548**	3.738**	2.728**
M.A.T. score	-	-	-1.912
Number of adult classes attended	3.216*	.447	.045

* Significant at .05 level.
** Significant at .01 level.

The inter-correlations of each of the variables used in this analysis of yearly gain in net worth is presented in Table XV.

TABLE XV

INTER-CORRELATIONS OF SIGNIFICANT INDEPENDENT VARIABLES AND YEARLY GAIN IN NET WORTH[1] N=528

	1	2	3	4	5
1. Age at beginning of training	1.000	.202**	.119**	-.129**	.158**
2. Total beginning capital		1.000	.171**	-.035	.246**
3. Size of business-tillable acres			1.000	.094*	.295**
4. Number of adult classes attended				1.000	.130**
5. Yearly gain in net worth					1.000

* Significant at .05 level. ** Significant at .01 level.

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[1] The complete table of inter-correlations may be found in Appendix Table XLI (infra 136).

TABLE XVI

MULTIPLE CORRELATION COEFFICIENTS FOR YEARLY GAIN IN NET WORTH REGRESSION ANALYSES

	N=528	N=210	N=116
Coefficients of Correlation All variables: R=	.45607**	.47903**	.57114**
Coefficients of Correlation Squared All variables: R^2=	.20800	.22178	.32654
Coefficients of Correlation Selected variables: R=	.42155**	.43528**	.50138**
Coefficients of Correlation Squared Selected variables: R^2=	.17771	.18947	.25139

** Significant at the .01 level.

Summary

The farm businesses under study were basically one-man owner operated farms, with about average investments in farm capital. The object of this chapter was to examine the relationship between the variables studied and the success of these farm businesses as measured by gross income, net income, and yearly gain in net worth.

Because data were not available for two of the variables for all 528 subjects sampled, two sub-samples of two hundred ten and one hundred sixteen subjects each were utilized to maximize the use of the data. An adaptation of a two sample _t_ test suggested that the groups are homogeneous in all but one of the independent variables.

Data were analysed with the multiple regression technique to determine the relationship of each variable to the criterion measure.

It was evident that the various measures of farm success used in this study could not all be predicted with the same combination of independent variables. Some measures of success, such as gross income, appeared to be more sensitive to changes in certain variables than did other success measures. The selection of variables for final regression equations for each of the criterion measures is summarized in Table XVII. There is a particular lack of communality of independent variables for predicting net income and yearly gain in net worth.

A similar summary is presented in Table XVIII where the results of the recombination of variables in multiple regression equations for each of the criterion measures is presented. Since a regression equation was computed for each of the three sample groups, the table indicates the number of equations in which each variable was significant at the .05 level.

The R^2 values indicate that a more efficient prediction can be made of gross income than of the other criterion measures, net income and yearly gain in net worth. The most significant variables for this prediction were: Age at beginning of training total beginning capital, number of years as farm operator, size of business-tillable acres, Ratio:Total fixed capital/total beginning capital, and number of adult classes attended. Beginning tenure status, M.A.T. score and Ratio: Beginning net worth/total beginning liability also proved significant in the equations developed for the smaller sub-sample.

TABLE XVII

SUMMARY OF VARIABLE SELECTION FOR ALL CRITERION MEASURES: GROSS INCOME, NET INCOME, YEARLY GAIN IN NET WORTH

Variable	Retained for Analysis of: Gross Income	Net Income	Gain in Net Worth
Age at beginning of training	Yes		Yes
Beginning tenure status	Yes	Yes	
Total beginning capital	Yes	Yes	Yes
Size of business - work units		Yes	
Number of years as farm operator	Yes		Yes
Size of business - tillable acres	Yes		Yes
Highest school grade completed	Yes	Yes	
Years of high school Vo-Ag.	Yes		
M.A.T. score	Yes		Yes
Ratio: $\frac{\text{Total fixed capital}}{\text{Total beginning capital}}$	Yes		
Ratio: $\frac{\text{Total net worth}}{\text{Total liability}}$	Yes		
Number of adult classes attended	Yes		Yes
Ratio: $\frac{\text{Months of I.O.F.T.} \times 25}{\text{Total capital}}$		Yes	

It is not very meaningful to discuss in detail the predictors of net income, since the variables used in this study explain less than 10 per cent of the variation in this measure. The study suggests that net income as recorded for income tax purposes, is not a very accurate measure of farm success. Other unidentified factors must be accounted for to accurately predict this income measure.

Yearly gain in net worth was closely allied with gross income and was subject to prediction by some of the same variables. Those most significant were: age at beginning of training, total beginning capital, size of business in tillable acres and the number of adult classes attended. The number of years as a farm operator was also significant in the first sub-sample.

The three classifications of variables, educational, biographical and economic, all were significant in predicting farm success. Because this study was concerned primarily with the effects of the educational component, it was encouraging that the number of adult classes attended remained as a significant variable. While much attention had been focused on the role of preparatory education on success, less had been placed upon the upon the role of continuing education. The failure of the other measures of the educational component to add significantly to the measures of success, does not necessarily discount their importance to the farmer and his family. The gross nature of the measure of these attributes as used in this study has failed to describe their contribution to the financial success of the farm business.

TABLE XVIII

FACTORS RELATED TO FARM SUCCESS: SUMMARY OF SIGNIFICANCE OF SELECTED VARIABLES FOR THREE CRITERION MEASURES

Variable	Number of Significant Partial Regression Coefficients		
	Gross Income	Net Income	Yearly Gain in Net Worth
Age at beginning of training	3	-	3
Beginning tenure status	2	3	-
Total beginning capital	3	2	3
Size of business - work units	-	1	-
Number of years as farm operator	1	-	1
Size of business-tillable acres	1	-	3
Highest school grade completed	0	1	-
Years of high school Vo-Ag.	0	-	-
M.A.T. score*	1	-	0
Ratio: $\frac{\text{Total fixed capital}}{\text{Total beginning capital}}$	1	-	-
Ratio: $\frac{\text{Total Net Worth}}{\text{Total liability}}$	1	-	-
Ratio: $\frac{\text{Months of I.O.F.T.} \times 25}{\text{Total Capital}}$	-	0	-
Number of adult classes attended	1	-	1

* Maximum number of significant values is only 1.

CHAPTER VI

THE EDUCATIONAL COMPONENT

Data for the sample of two hundred ten farmers were subjected to an analysis of multiple covariance to investigate the educational component in more detail. The purpose of this procedure was to ignore the effects of the economic and biographical variables, and concentrate attention solely on those factors which have been described as part of the educational component. The variables G.C.T. score, highest school grade completed, months of institutional on-farm training and the number of adult evening classes attended served to define the educational component.

Studies commonly report the financial benefits that accrue to groups of individuals who have completed various levels of education. One such study is reported in the literature review[1]. It could be hypothesized that significant differences between groups would also occur if each of the other three factors of the educational component were examined separately.

The following series of tables presents the mean squares and F ratios for the analysis of multiple covariance for each variable. Gross income, net income and yearly gain in net worth were used in turn as criterion measures. The relationship of each independent variable to a criterion measure was examined separately, while the influence of the remaining educational factors was controlled mathematically in the multiple covariance computation.

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[1] Education, An Investment In People. op. cit.

G.C.T. Scores

The general level of intelligence, as measured by G.C.T. scores had no significant relationship to the measures of farm success. General support is thus given to the fact that G.C.T. scores failed to register as significant in the multiple regression analyses described in the previous chapter.

Before one can say conclusively that intelligence and farm success are unrelated, however, some thought must be given to the nature of the sample and circumstances under which the attribute "intelligence" was measured. Both considerations in this study would prompt the researcher to withhold judgement. Few would argue that the G.C.T. tests for the attribute intelligence were given under circumstances which were less than ideal. Although the G.C.T. was designed for standardized administration, there was little assurance that these procedures were carefully followed, or that the test subjects were properly motivated to achieve well.

The failure of the subjects to represent the upper continuum of the G.C.T. score scale posed another limitation on the relationship of G.C.T. scores to measures of income. As described in Chapter V, this resulted in a bimodal distribution of scores with a below average mean and compressed score range. The study, therefore, concentrates on the relationship of those scores approximately at or below the mean . If any higher score range on the G.C.T. test were to prove as a threshhold for marked success in the farm business, the relationship would not be evident in this study.

TABLE XIX

ANALYSIS OF COVARIANCE OF THE VARIABLE G.C.T. SCORE ADJUSTED FOR THE COVARIATES MONTHS OF I.O.F.T., ADULT CLASSES ATTENDED AND HIGHEST SCHOOL GRADE COMPLETED CRITERION MEASURE: GROSS INCOME

Source of Variation	Degrees of Freedom	Mean Squares	F Ratio
Between Groups	4	103910000	1.169
Within Groups	202	88917500	
Total	209	88285700	

TABLE XX

ANALYSIS OF COVARIANCE OF THE VARIABLE G.C.T. SCORE ADJUSTED FOR THE COVARIATES MONTHS OF I.O.F.T., ADULT CLASSES ATTENDED AND HIGHEST SCHOOL GRADE COMPLETED CRITERION MEASURE: NET INCOME

Source of Variation	Degrees of Freedom	Mean Squares	F Ratio
Between Groups	4	35984900	1.402
Within Groups	202	25660100	
Total	209	25185900	

TABLE XXI

ANALYSIS OF COVARIANCE OF THE VARIABLE G.C.T. SCORE ADJUSTED FOR THE COVARIATES MONTHS OF I.O.F.T., ADULT CLASSES ATTENDED AND HIGHEST SCHOOL GRADE COMPLETED
CRITERION MEASURE: YEARLY GAIN IN NET WORTH

Source of Variation	Degrees of Freedom	Mean Squares	F Ratio
Between Groups	4	1690450	.630
Within Groups	202	2682550	
Total	209	2633980	

The G.C.T. scores were grouped according to the following scheme: less than 71, 71-90, 91-110, 111-130, greater than 130. An approximation of the frequency distribution can be obtained by referring to Chapter V, Figure 1, (supra 51).

Highest School Grade Completed

The significant relationship of years of school to yearly gain in net worth and the near significance of the relationship to net income, bears out the statements commonly made of the relationship of education to income. The analysis reported in Chapter V, however, ties measures of schooling to success only when the criterion used is net income.

Table XXII indicates that there is no relationship between the variable, highest school grade completed, and the criterion measure, gross income. This finding is consistant with the results obtained in the regression analysis reported in the previous chapter.

TABLE XXII

ANALYSIS OF COVARIANCE OF THE VARIABLE HIGHEST SCHOOL GRADE COMPLETED, ADJUSTED FOR COVARIATES G.C.T., MONTHS OF I.O.F.T. AND ADULT CLASSES ATTENDED CRITERION MEASURE: GROSS INCOME

Source of Variation	Degrees of Freedom	Mean Squares	F Ratio
Between Groups	4	45057500	.5025
Within Groups	202	89675000	
Total	209	88285700	

TABLE XXIII

ANALYSIS OF COVARIANCE OF THE VARIABLE HIGHEST SCHOOL GRADE COMPLETED, ADJUSTED FOR COVARIATES G.C.T., MONTHS OF I.O.F.T. AND ADULT CLASSES ATTENDED CRITERION MEASURE: NET INCOME

Source of Variation	Degrees of Freedom	Mean Squares	F Ratio
Between Groups	4	57050900	2.2644
Within Groups	202	25172400	
Total	209	25185900	

Intervals chosen for this analysis were less than 9, 9-10, 11-12, 13-14 and more than 14 years of school completed. The majority of the cases fell in the intervals less than 9 years, and 11-12 years. An approximation of the distribution of highest school grade completed is shown in Chapter V, Figure 2, (supra 52).

TABLE XXXIV

ANALYSIS OF COVARIANCE OF THE VARIABLE HIGHEST SCHOOL GRADE COMPLETED, ADJUSTED FOR COVARIATES G.C.T. MONTHS OF I.O.F.T. AND ADULT CLASSES ATTENDED CRITERION MEASURE: YEARLY GAIN IN NET WORTH

Source of Variation	Degrees of Freedom	Mean Square	F Ratio
Between Groups	4	7349010	2.839*
Within Groups	202	2575100	
Total	209	2633980	

* Indicates F ratio significant at the .05 level.

The failure of years of schooling to relate significantly to yearly gain in net worth in the regression analysis, yet prove to be significant when only the education component is considered, suggests that there may be a formula whereby this factor, years of schooling, can be substituted for some of the economic prerequisites for farm success.

The statistical summary of the data supports the hypothesis that a positive relationship of formal schooling to farm income does exist. A judgement of the magnitude of the relationship, however, may best be made after further study.

Months of Institutional On-Farm Training

No differences are apparent between groups categorized according to the months of I.O.F.T. completed, regardless of the farm success measure employed. Some thought should be given to the nature of the I.O.F.T. program. The attendance requirements were high. Each veteran must have attended two-hundred hours of class instruction and one-hundred hours of group instruction per year in addition to twice monthly individual on-farm visitations. The data shows the average number of months of instruction to be high (thirty-eight months). If the diminishing return effect suggested by Cvancara[1] is operative, it is possible that most veterans in this study had reached a point of diminishing marginal return.

Another factor considered was that those who were initially very successful as farm operators usually attended training for only a short time. When labor earnings was above $2,400 per year, the veteran was required to refund part or all of his training payment. Subsequently, the filing of the first financial statement was often a cue to drop the training program. While the number who dropped training because of high financial success may not be large, to deny their existence would be unfounded.

TABLE XXV

ANALYSIS OF COVARIANCE OF THE VARIABLE MONTHS OF I.O.F.T.
ADJUSTED FOR THE COVARIATES G.C.T., HIGHEST SCHOOL
GRADE COMPLETED AND ADULT CLASSES ATTENDED
CRITERION MEASURE: GROSS INCOME

Source of Variation	Degrees of Freedom	Mean Square	F Ratio
Between Groups	4	29988100	.3315
Within Groups	202	90455000	
Total	209	88285700	

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[1] Cvancara, Joseph George *op. cit.*

TABLE XXVI

ANALYSIS OF COVARIANCE OF THE VARIABLE MONTHS OF I.O.F.T. ADJUSTED FOR THE COVARIATES G.C.T., HIGHEST SCHOOL GRADE COMPLETED AND ADULT CLASSES ATTENDED CRITERION MEASURE: NET INCOME

Source of Variation	Degrees of Freedom	Mean Square	F Ratio
Between Groups	4	10820300	.4187
Within Groups	202	25843000	
Total	209	25185900	

TABLE XXVII

ANALYSIS OF COVARIANCE OF THE VARIABLE MONTHS OF I.O.F.T. ADJUSTED FOR THE COVARIATES G.C.T., HIGHEST SCHOOL GRADE COMPLETED AND ADULT CLASSES ATTENDED CRITERION MEASURE: YEARLY GAIN IN NET WORTH

Source of Variation	Degrees of Freedom	Mean Square	F Ratio
Between Groups	4	4959120	1.899
Within Groups	202	2611390	
Total	209	2633980	

The intervals used in this analysis were less than 19, 19-25, 26-32, 33-39, and greater than 39 months of training.

Number of Adult Classes Attended

The relationship of adult class attendance to gross income was the same as exhibited in the multiple regression analysis. No additional information was gained from considering the other criterion measures. The general conclusion of the positive relationship of education to income was strengthened in this analysis. The analysis pointed to the important impact of continuing education on general farm productivity as measured in gross income. Since this variable included adult instruction of varying degrees of intensity, determining the effects of different kinds of adult instruction on measures of income may be the next logical step for further study.

The five categories chosen for the number of adult classes attended were less than 21, 21-40, 41-60, 61-80 and more than 80 meetings attended during the 1960-1965 period. Meetings were not differentiated by type.

TABLE XXVIII

ANALYSIS OF COVARIANCE OF THE VARIABLE NUMBER OF ADULT CLASSES ATTENDED ADJUSTED FOR COVARIATES G.C.T., HIGHEST SCHOOL GRADE COMPLETED AND MONTHS OF I.O.F.T. CRITERION MEASURE: GROSS INCOME

Source of Variation	Degrees of Freedom	Mean Square	F Ratio
Between Groups	4	234936000	2.733*
Within Groups	202	86328000	
Total	209	88285700	

* Indicates F ratio significant at the .05 level.

TABLE XXIX

ANALYSIS OF COVARIANCE OF THE VARIABLE NUMBER OF ADULT CLASSES ATTENDED ADJUSTED FOR COVARIATES G.C.T., HIGHEST SCHOOL GRADE COMPLETED AND MONTHS OF I.O.F.T. CRITERION MEASURE: NET INCOME

Source of Variation	Degrees of Freedom	Mean Square	F Ratio
Between Groups	4	1412130	.05025
Within Groups	202	26048000	
Total	209	25185900	

TABLE XXX

ANALYSIS OF COVARIANCE OF THE VARIABLE NUMBER OF ADULT CLASSES ATTENDED ADJUSTED FOR COVARIATES G.C.T., HIGHEST SCHOOL GRADE COMPLETED AND MONTHS OF I.O.F.T. CRITERION MEASURE: YEARLY GAIN IN NET WORTH

Source of Variation	Degrees of Freedom	Mean Squares	F Ratio
Between Groups	4	3208040	1.2073
Within Groups	202	2657270	
Total	209	2633980	

Summary

The object of the analyses presented in this chapter was to examine separately, and in more detail, the relationships of each member of the education component to the criterion measures. Effects of the variables not under study were mathematically controlled by means of a multiple co-variance procedure.

The results are not appreciably different than those from the multiple regression analysis previously described. The G.C.T. score is not significantly related to any of the three measures of farm success used in this study. A study of the G.C.T. distribution with its limited range and bimodal configuration suggests that judgement of the true relationship of intelligence to farm success should be withheld pending further investigation.

The highest school grade completed was significant only when farm success was measured by yearly gain in net worth, but was almost at a significant level when net income was the criterion measure. This finding supports other works which show positive relationships of schooling to income. The relationship of schooling to yearly gain in net worth is not exhibited in the multiple regression analysis previously reported. One can hypothesize that there may be a substitution relationship between years of schooling and the economic factors which are most closely related to gain in net worth.

Months spent in institutional on-farm training appears to have no effect. Previous discussion suggests that the intensity of the training and the extensive time spend by most trainees, as well as the complications of restrictions on income, confounded any true relationship tha my have existed between time spent in formal on-the-job training and farm success.

The relationship of adult education to success concurs with and supports the relatively few sophisticated studies in this field and particularly the Cvancara study.[2] It analysizes the role of adult education in the multiple regression equation for the farm success criteria, gross income and yearly gain in net worth. The variable measures only the quantity of recent adult education rather than the quality. A refinement of the variable to reflect quality of adult instruction as well as quantity may result in an even greater significant relationship to the various measures of farm success.

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[2] Cvancara, Joseph G., op. cit.

CHAPTER VII

THE RELATIONSHIP OF INCOME TO CHILDREN'S APTITUDE AND SCHOOL ACHIEVEMENT

The studies of P.C. Sexton[1] and Lenore Epstein[2] prompted an examination of the hypothesis that there is a linear relationship between farm income and measures of aptitude and achievement of farm children. The examination of this relationship using several different measures of farm income as criterion measures had not been attempted, using only farmers and their children as subjects. It was feasible to assume that the relationship, if any, might be different when considering the several measures of farm income. A farm population that is characterized by a strong tendency to be almost completely self-employed, and which lacks the distinct class structure found in some urban communities, may not exhibit the same relationships between income and aptitude as does a city population.

To provide accurate information on the income status of farm families required the compilation of detailed data on several measures of farm income and success. The criterion measures of gross income, net income and yearly gain in net worth used for the first two objectives of this study, provided the necessary data with which to make a detailed analysis of the relationship of these income measures to children's aptitude and achievement.

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[1] Sexton, P.C., Education and Income, (New York: Viking Press, 1961), p. 298.

[2] Epstein, Lenore A., Effects of Low Income on Children, Social Security Bulletin, February 1961.

Minnesota schools generally follow a comprehensive program of testing aptitudes and achievement as an aid to counseling and guiding students. A large number of schools, in fact, participate in a state-wide testing program designed to give comparable data between schools and to utilize the most efficient instruments for making the desired psychological measurements.

Because some diversity does exist in testing programs, a rather wide variety of testing instruments is used in assessing both achievement and aptitude. The variety of tests presented a serious problem in this survey study since the various instruments were not all designed to measure the same psychological constructs. For example, student A, whose standard score was 100 on test A may not have possessed the same level of "aptitude" as student B whose standard score was also 100 but on test B, when "aptitude" is defined by the two test makers in terms of different psychological constructs. The problem was to select only those students who had been given the same aptitude tests, thus eliminating the effects of diverse psychological measurement.

Since neither the most commonly administered achievement test for this particular sample, nor the most commonly administered aptitude test was known prior to the study, the selection of the instruments to be used was done after data were collected. As each questionnaire was returned from a subject, a card was prepared for each child who was enrolled in the fourth grade or above listed on the questionnaire. The data collection card was designed to be similar to the test record section of the student cumulative record folder commonly used in Minnesota. Prepared cards were sent to the principal of each school asking that the information be provided for this study. Copies of the data form and accompanying letters are exhibited in Appendix A.

Replies were received from almost all schools surveyed. Some, however, were rural schools which did not have a testing program, some schools had local policies prohibiting dissemination of the information requested and some reported test scores which were not compatible to this study. Although test scores were received on six hundred and ten of the children surveyed, the selection of tests and individuals as described in the remainder of this chapter reduced the number of returns used in the correlation analyses.

The most prevalent aptitude test given by the schools surveyed was the Lorge-Thorndike Intelligence Test. This test has a national mean of 100 with a standard deviation of 16. The Lorge-Thorndike Intelligence Test was especially appropriate for this study, since the standard scores are assumed to be comparable between grade levels. It was possible to utilize scores from students in several grades with some assurance that the scores represented comparable levels of the aptitude construct upon which the test was developed. Returns listing scores from this instrument were received for children from one hundred and forty-five different families.

The achievement levels were also measured by a variety of instruments. The two most common tests used were the Iowa Tests of Basic Skills and the Iowa Tests of Educational Development. Because the two tests measure different aspects of school achievement, the more prevelant test, the Iowa Tests of Basic Skills, was selected for this study. Unlike the aptitude test selected, this test is not designed to measure the same psychological construct at each grade level. The scores are recorded in percentile ranks, and serve to indicate at each grade level, the relative standing of the student in relation to the norm peer group.

Since the object of this study was more concerned with relative achievement than absolute achievement, the assumption was made that a student who scored at the 90th percentile in grade six had approximately the same level of achielvement as a student who scored at the 90th percentile of grade five. Percentile scores were converted to a normalized T score with a mean score of fifty and a standard deviation of ten. Scores now had a near normal distribution suitable for correlation analysis.

The decision was made to treat achievement measures and intellegence measures as completely autonomous variables thus eliminating the necessity for a child to have both a Lorge-Thorndike

Intelligence Test score and an Iowa Tests of Basic Skills score to be included in the analysis. A random sample with replacement was drawn of the I.Q. scores of two children for each family unit for which a child had a Lorge-Thorndike Intelligence score. The scores were used in a Pearson's Product Moment Correlation analysis with the criterion measures, gross income, net income, and yearly gain in net worth.

The same process of choosing a sample was followed for the achievement test. A random sample, with replacement, was drawn of two children from each family in which a child had an achievement score for the Iowa Tests of Basic Skills in grades four, five, six, seven or eight. These scores were used in Pearson's Product Moment Correlation analyses with the criterion measures gross income, net income and yearly gain in net worth. One hundred and twenty families were used in this analysis. A correlation was computed for the sample including the first child selected by the random process, and repeated for the sample including the second child.

Table XXXI presents the means and standard deviations of each of the sample groups for measures of aptitude and achievement. Considering that the expected mean score of Minnesota children would fall slightly above the national mean for both measures, the means of these test groups comply very closely to the expected means.

The selection of intelligence scores was done completely independently of the selection of achievement scores. Any computation of the inter-correlation of achievement and intelligence scores in this study would defy interpretation and would be completely without meaning.

TABLE XXXI

MEANS AND STANDARD DEVIATIONS OF APTITUDE AND ACHIEVEMENT TEST SCORES FOR SAMPLES OF MINNESOTA CHILDREN

	Mean	Standard Deviation
Lorge-Thorndike Intelligence Test National Norm - Standard Score	100.0	16.0
Lorge-Thorndike Intelligence Test Sample 1 - Standard Score	110.4	16.7
Lorge-Thorndike Intelligence Test Sample 2 - Standard Score	108.6	14.3
Iowa Tests of Basic Skills National Norm (Normalized T Score)	50.0	10.0
Iowa Tests of Basic Skills Sample 1 (Normalized T Score)	55.3	10.9
Iowa Test of Basic Skills Sample 2 (Normalized T Score)	56.8	10.6

The Relationship of Children's Aptitude Scores To Various Measures of Farm Earnings

An analysis was made of the relationship of children's aptitude scores to each of the measures of farm income. The analysis treated each child of the two-child sample in a separate correlation analysis, rather than presenting the correlation as an average of the two aptitude scores. Table XXXII presents the correlation coefficients for each of the correlation analyses between income measures and aptitude scores.

Data presented in Table XXXII indicate clearly that there was no significant relationship between the aptitude test scores of these farm children and the income from the parents' farm. Income was represented not only by the short term measures of cash incomes, but by the long term measure of increases in net worth. While a linear relationship may have existed for an urban population, as suggested by Sexton, it was not apparent for the rural sector represented by the sample in this study. The urban study was principally a study of the relationship of membership in economic and social classes on children's aptitudes. The lack of a distinct social class structure in the rural farm population may suggest that differences in economic returns occurring within the same social class are less effective in influencing children's aptitudes than are such differences when they result in membership in different social classes.

Another basic difference between the rural farm population and the urban population was the singularity of the farm population in labor-management relationships. Any urban study would include workers representing all ranks of labor ranging from the lowest paid itinerate worker to the levels of top business management. A rural farm study presents a different labor distribution. This population, with few exceptions, consists totally of business management entrepreneurs. While it is true that they are recipients of a wide range of economic reward for their business effort, they are nevertheless, still enjoying the unique position of being self-employed. Self-employment together with the lack of distinct economic and class structure among the farm population, may explain the lack of relationship of income measures to children's aptitudes.

TABLE XXXII

CORRELATION COEFFICIENTS OF LORGE-THORNDIKE INTELLIGENCE TEST SOCRES OF FARM CHILDREN WITH MEASURES OF FARM INCOME

Relationship	Correlation Coefficient
I.Q. of first child to Gross Income	.0026
I.Q. of second child to Gross Income	.0194
I.Q. of first child to Net Income	.0047
I.Q. of second child to Net Income	.0105
I.Q. of first child to Yearly Gain in Net Worth	-.0637
I.Q. of second child to Yearly Gain in Net Worth	.0133

* Correlations significantly different from zero at the .05 level.

The Relationship of Children's School Achievement Scores of Various Measures of Farm Income

The correlation analyses of income measures with children's achievement scores followed the same pattern as presented for aptitude scores. A summary of the correlation analyses is presented in Table XXXIII.

The table illustrates no significant relationship between children's school achievement scores and farm income when income is measured in the short term as defined by gross and net income or the long term as defined by yearly gain in net worth. While this result is inconsistant with that found by Sexton, it is wholly consistant with the relationship of children's aptitude with farm income as previously described by this study.

TABLE XXXIII

CORRELATION COEFFICIENTS OF IOWA TEST OF BASIC SKILLS AS NORMALIZED T SCORES WITH MEASURES OF FARM INCOME

Relationship	Correlation Coefficient
Achievement of first child to Gross Income	.0491
Achievement of second child to Gross Income	-.0682
Achievement of first child to Net Income	-.0421
Achievement of second child to Net Income	-.1044
Achievement of first child to Yearly Gain in Net Worth	-.0731
Achievement of second child to Yearly Gain in Net Worth	-.0679

* Correlations significantly different from zero at .05 level.

One may hypothesize that the factors which inhibit a linear relationship between income and aptitude for children of farm families have a similar effect upon the relationship of income to achievement scores. Granting that these factors remain at this time undefined, the preceeding discussion suggests that social and economic class membership,as well as the unique homogeneity of the labor management relationship may be factors to consider in defining the responsiveness of children's aptitude and achievement test scores to variations in parental income.

The lack of relationship between farm income and the aptitude and achievement of farm children should offer some clues to the criteria which should be used in improving rural educational opportunity. Programs in which the need for improved education is defined on the basis of parental income may not be the most appropriate; rather, criteria related to the overall adequacy of the educational opportunity provided by the rural school system, regardless of parental income, may be more closely allied to the real need for school improvement. Such criteria may divert attention from the superficial relationship of earnings to achievement, to the more realistic relationships between small school size, less adequate teacher preparation, and limited opportunity for exploration of several disciplines, to the achievement and aptitude of rural children.

CHAPTER VIII

GENERAL SUMMARY AND CONCLUSIONS

The main purpose of this project was to study the relationships of educational, economic and biographical variables to farm success. Understanding these relationships was prerequisite to devising a means of predicting success for a young man contemplating production agriculture as an occupation. Special attention was focused on the role of the educational component in that prediction.

Supplementary to these main objectives was a determination of the relationship of farm financial success to the achievement and aptitude of farm children in school.

The Procedure: Minnesota has a large number of current farm operators who began farming following World War II. Many were enrolled in institutional on-farm training provided by Public Law 16 and Public Law 346. This pool of potential subjects met the criteria outlined to minimize the effects of varying exposure to technological innovation and the effect of varying stages in the farm price cycle.

The sample consisted of all veterans who were currently farming who had been trained at forty schools that still retained their records of the I.O.F.T. program. Vocational agriculture instructors and county managers of the Agricultural Stabilization Committee identified 1,506 veterans whom they believed to be still farming.

Training records contained information necessary to assess the economic and biographical inputs of each veteran's farm business. The educational input was assessed from the veterans' training record, files of the armed services, questionnaires, and interviews. To assess the degree of success of the farm business in terms of gross income, net income and yearly gain in net worth, it was necessary to gather current information from each farmer. A questionnaire response followed by random interviews produced five hundred twenty-eight useable responses to questions of income and net worth status. An inquiry to the records center for the Armed Forces produced information on intelligence level (G.C.T. scores) and mechanical aptitude (M.A.T. scores) for two hundred ten and one hundred sixteen subjects respectively.

The lack of G.C.T. and M.A.T. scores for all subjects prompted a division of the total sample into two additional sub-sample groups; one containing G.C.T. scores and one containing both G.C.T. and M.A.T. scores. All samples were subsequently used in statistical analyses. An approximate test of homogeneity showed the three sample groups to be very similar in character for all variables except the age of the farm operator.

The independent variables judged appropriate for inclusion were: age of farm operator at the beginning of training, beginning tenure status, total beginning capital, size of business - work units, number of years as farm operator, months of I.O.F.T. completed, size of business - tillable acres, number of children, highest school grade completed, years of high school Vo-Ag, G.C.T. score, M.A.T. score, ratio: fixed capital/total beginning capital, ratio: net worth/beginning liability, number of adult classes attended and ratio: months of I.O.F.T. x 25/ total capital.

The sixteen independent variables were combined in multiple regression equations with gross income, net income and yearly gain in net worth used in turn as criterion measures. The significance of each variable to the total regression was then assessed. Variables which appeared to be significantly related to the criterion in the first equation were recombined in a final equation for the prediction of each dependent variable. Inter-correlations for all variables were also computed.

Four measures of the educational component, G.C.T. score, highest school grade completed, months of I.O.F.T. and number of adult classes attended were combined in analyses of multiple covariance. Each measure served in turn as the main effect variable, with the other measures acting as covariates.

When the names were secured for the children of all veterans, requests were sent to their respective schools for information on intelligence and achievement for each child. The most prevalent responses, the Lorge-Thorndike Intelligence Test and the Iowa Tests of Basic Skills were used to measure the attained levels of intelligence and achievement, respectively. The strength of the relationship between these measures of intelligence and scholastic achievement and the criterion income measures was determined by Pearson's Product Moment Correlation.

The Findings

Some accuracy was obtained in predicting gross income with a multiple regression formula which utilized the variables age at beginning of training, beginning tenure status, total beginning capital, number of years as a farm operator, size of business - tillable acres, ratio: fixed capital to total capital and the number of adult classes attended. The smaller sub-sample shows M.A.T. scores and ratio: beginning net worth/ total beginning liability to be significant, in place of some variables significant in the large sample. Approximately 30 per cent of the variation in gross income was attributed to variations in these variables. The education component was represented by the number of adult classes attended. All other variables were related to the economic input of the beginning farm business or to the biographical status of the veteran.

While the variables beginning tenure status, total beginning capital and highest school grade completed, were significantly related to net income, the value of these factors as predictors was limited. Size of business - work units was also significant but only in the smallest sub-sample. Even when all fourteen variables were considered, only about 8 per cent of the variability in net income could be explained by the regression equation. The predictability, or R^2 value, was considered too low to devote much attention to net income as a farm success measure.

Yearly gain in net worth, while closely allied to net income, was more highly correlated with gross income. The variables, age at beginning of training, total beginning capital, size of business - tillable acres and number of adult classes attended, all made a significant contribution to the prediction formula for yearly gain in net worth. The number of years as a farm operator was significant only for the first sub-sample. These variables accounted for about 18 per cent of the variation in the criterion, and were from the same group of variables found significant for predicting gross income.

Separate analysis of each factor of the education component helped to strengthen understanding of their relationship to the various measures of farm success. An analysis of multiple covariance was employed for this study.

The measure of intelligence, G.C.T., proved again to have no significant relationship to any of the success measures. It is suggested that failure to exhibit the expected positive relationship may be due to the nature of the variable. Scores for the G.C.T. test did not represent the full range of expected values, and were rather heavily bunched at and below the standard mean. There is also some question of the use of G.C.T. as a micro-measure of the attribute intelligence due to the conditions under which the test was given.

When subjects were grouped according to the years of school completed, significant differences occurred when the criterion measure was yearly gain in net worth. Differences were not quite significant when measured in net income. The significance of years of school completed when considered in the absence of economic variables and failure to register as significant when economic variables are included, suggests that there may be a substitution relationship between these variables.

When subjects were grouped according to the months of institutional on-farm training attended, no significant difference occurred between groups for any of the criterion measures.

The relationship of the number of adult classes attended to farm success is positive and significant except when net income is the criterion measure. This relationship supports the general practice of adult education for farm people and points to the importance of adequate and continuing training as an important aspect of financial success.

The relationship between measures of parental farm income as measured by gross income, net income, or gain in net worth, and the intelligence of farm children as measured by the Lorge-Thorndike Intelligence Test are all insignificant. A similar examination of the relationship between measures of income and scholastic achievement as measured by the Iowa Tests of Basic Skills produced no significant results.

The Conclusions:

Net income as reported for income tax purposes, is not a satisfactory measure of farm success, except under specified conditions. The ability of farmers to manipulate this variable during any one year confuses the relationship to predictive variables. A long-term average of this measure, however, adds stability to the measure and increases the propensity of this variable to prediction.

Farm success is closely tied to the economic inputs in the beginning stages of the farm business. Such economic measures as beginning capital investment and farm size in tillable acres are important predictors of farm success. Those counseling young men to begin farming should be particularly aware of the importance of economic inputs and should give careful consideration to the deployment of the economic resources to insure adequate farm size.

Since age at beginning of training was significant in almost all analyses, the importance of this factor to success must be carefully weighed. While it is true that the men in this study were older than would be normally expected when a career choice was first made, it does suggest that delayed career choice in production agriculture diminishes the chances for success. While mobility out of production agriculture may and does occur at all ages, indications are that successful mobility into production agriculture should be confined to the young farm operator who has a higher probability of farm success.

The failure of aptitude scores to relate significantly to farm success should be more carefully examined. The compressed score distribution, the circumstances under which the tests were given, the constructs upon which the test was based and the selectivity of the sample may all contribute to the lack of significance in this study. It is necessary, therefore, to examine this attribute in more detail, using more refined instruments before a judgment can be made of the importance of this attribute to farm success.

The education components dealing with formal training require careful study. The relationships of these factors to farm success appear to be clouded with interactions and elements of a substitution effect.

Formal schooling shows little relationship to success in any of the regression equations, yet proves significant in the covariance analysis with gain in net worth as a criterion measure. This phenomenon suggests that a substitution element is active between the economic inputs included in the regression equation and formal schooling. It may be possible to substitute capital investment or other economic inputs for some formal schooling without reducing the probability of farm success.

Differences in the number of months spent in institutional on-farm training was not a contributing factor in the prediction of farm success. Two conflicting hypotheses can be evolved, either of which may explain this phenomenon. The participants may have been subject to a rapidly diminishing marginal return and thus, those with a limited number of months of training may have accrued nearly as much impetus for improving income as did those who were enrolled for a longer time.

The second hypothesis, and that given support by other findings in this study, suggests that it is probable that the length of time the veteran was enrolled had a positive effect upon income. The passage of time since training was discontinued has nullified any marginal gain in income potential caused by the longer training periods. The evidence points to the fact that there is a constant need for continuing programs of instruction when the subjects have had little formal schooling, and particularly in an industry that is marked by rapid upward changes in productivity prompted by a rapidly expanding pool of technological information.

The significance of recent adult instruction to farm success supports the second tenet. The number of adult classes attended during the last five years of the study was related to both gross income and yearly gain in net worth.

The significance of this finding has implication for vocational program planning. One of the important considerations to be made in predicting the success of beginning farmers is availability of systematic programs of continuing education in agriculture. Attention should be focused on adult instruction as a means of improving farm incomes for those who have had little prior educational opportunity, and for constantly upgrading the competencies and skillsof those who have had more extensive vocational training. It is feasible that the adult education programs most economically suited to improve income will be geared in part to the prior training the participant has received.

Programs of instruction, similar in design to the I.O.F.T. program as exemplified by the Minnesota Farm Management Program in vocational agriculture, may serve as the model for intensive education needed to supplement a limited formal school background or a lack of preparation in entrepreneurial skills. Other less intensive programs may best serve the farmer who desires upgrading of competencies to keep abreast of changing technology, but who has an adequate command of the economic principles needed to make sound business management decisions.

A more careful evaluation is needed of the various kinds of continuing vocational programs now offered to beginning and established farmers to determine the type of program which can provide maximum marginal economic return for the educational inputs of the community and the cooperating farmer. Care must be taken to assess both the long-term and short-term effects of educational investment to allow maximum returns from deployment of the educational resource.

There is no significant relationship between the income of farm families and the level of achievement of their children as measured by a common standardized achievement test. Income is measured in both the long and short term by net income, gross income and yearly gain in net worth. Likewise, there is no relationship between these income measures and the aptitude of the child.

While no proof of the cause of this relationship is evident, it is hypothesized that the common social class membership and self-employment status of farm people may be contributing factors to the lack of sensitivity of school achievement and aptitude to variation in income.

The lack of a significant relationship suggests that the criterion 'parents income', now used as the basis for eligibility for some programs of federal aids to education, should be modified to more clearly reflect the needs of the participating children when the residents of the school district are predominantly rural farm.

Undoubtedly, there is still a need to study the effects of intelligence upon farm success, remaining cognizant of the economic principles of opportunity cost of intellectual investments. The use of other forms of psychological measurement may be warranted to help locate or devise measures which will better predict farm success. A study of education, aptitudes, attitudes and interests in combination with the dominant economic variables may provide the key to better prediction of farm success.

Greater attention needs to be given to the role economic factors play in establishment in the farm business, to establish thresholds of economic investment above which success can more readily be predicted. Such an investigation cannot be made independently of the assessment of the needs for educational and intellectual investment. It is suggested that such a venture would require the combined attention of those concerned with education in agriculture and those who have greater insights into the economics of agricultural establishment and production.

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APPENDIX A

School ____________

INFORMATION AVAILABILITY SURVEY - Selected Schools

Please respond to this survey by checking the appropriate blank. This survey is to determine availability of information only. It is not necessary to compute any of the items listed below.

PL 346 and PL 16 Veterans On the Farm Training Program records are____ are not______ on file in this Agriculture Department.

If records are available, please complete the remainder of this survey form.

How many PL 346 and PL 16 veterans' records are on file in this school? ____________

PERSONAL INFORMATION

	Information available from veterans' records on file	Information unavailable
Veteran's name		
Veteran's service number		
Veteran's C number		
School district of current residence		
MAT score - service entrance		
GCT score - service entrance		
Age at beginning of training		
Marital status at beginning of training		
Number of dependent children at beginning of training		
Last school grade completed by veteran		

STATUS OF VETERAN'S FARMING PROGRAM

	Information can be transcribed directly from records	Information can be computed from records on file	Information unavailable
Tenure status - beginning of training			
Tenure status - end of training			
Value of land & buildings - beginning of training period			
Total value - all capital assets - beginning of training			
Total liabilities - beginning of training			
Total net worth - beginning of training			
Size of business in work units - beginning of training			
Labor earnings - each year or part year veteran was in training			
Total months of training eligibility			
Total months of training completed			
Total cost of this veteran's training			

Dear Mr:

The Agricultural Education Department is starting a research study that may provide an answer to the question: Is there a certain combination of resources, including intellectual resources, that are associated with the successful movement into the business of farming?

In order to find a starting point for this study we want to determine if certain information can be gathered from the files of veterans who enrolled in institutional on-the-farm training under PL 346 and PL 16. Since your school participated in the training program, we are asking for your help.

You will find a short check list enclosed. If the files have not been kept in your school, please indicate this on the survey form and return it to me. If the records have been kept, I would appreciate it if you would complete the form.

You will notice that the form does not ask for the actual information from the veteran's record. Just check if the information called for is or is not available in the files you have. If you pull one of the files for a veteran that completed training the availability of the information should be apparent.

Any data collected from the veteran's records will be used only in sums and averages. The individual's record will be kept in strict confidence in accordance with usual procedures for confidential material.

If your school is selected as a source of data, we will notify you and your school administration of our intent in this project.

Your cooperation in completing this form will be appreciated.

Sincerely,

Enclosure

BEGINNING TRAINING INFORMATION SHEET

Case No. ________

Training Center ____________

C. Number ____________________

Service Number ____________________

Name ____________________

Address ____________________

____

School District of Residence at Time of Training ____________________

Highest School Grade Completed ________

Age at the Beginning of Training ________

Marital Status (beginning) ________

Number of Children (beginning) ________

Beginning of Training

Tenure Status

Renter ______ Part Owner ________

Partner ______ Owner ________

Other (describe) ____________

____

Resources (at beginning of training)

Total Fixed Capital (land, buildings)
Operators Share $ ____________

Total Capital (land, buildings, machinery, livestock, cash and other investments)
Operators Share $ ____________

Total Liabilities $ ____________

Total Net Worth $ ____________

Labor Income For Each Year of Training:

19___ 19___ 19___ 19___ 19___

$ ___ $ ___ $ ___ $ ___ $ ___

( ) ( ) ( ) ( ) ( )

(Check if labor income is for only a part year).

Number of months of training eligibility

____

Number of months of training completed

____

Total cost of the training program

$ ________

Current Farming Status

Farming _____ Not Farming ________

Unknown ________

Current Address ____________________

____

(Check if unknown) ________

Is the veteran currently enrolled in adult agriculture classes in the training school? Yes ______ No ______

Type of Program

Farm Management ____________

Enterprise ____________

Farm Mechanics ____________

****

End of Training Tenure Status

Renter _____ Part Owner ________

Partner _____ Owner ________

Other (describe) ____________

****

Work Unit Computation

Item	No.		Factor	WU
Dairy Cows		X	14.00	
Other Dairy		X	2.00	
Beef Cows/Bulls		X	4.00	
Other Beef Breed		X	2.00	
Beef Feeders		X	.40	
Sheep-Mature		X	.25	
Sheep-Feeders		X	.30	
Hogs		X	.30	
Hens		X	.20	
Turkeys		X	.40	
Corn-Husked		X	1.10	
Peas, Small Grain		X	.70	
Soybeans		X	.70	
Corn Silage		X	1.70	
Alfalfa Hay		X	.90	
Other Hay, Grain		X	.60	
Silage, Fallow		X	.60	
Sweet Corn		X	1.00	
Seed Corn		X	3.00	
	Total			

Veterans Name and Address (During Training)	Current Occupation Status (Check One)			Current Address (Complete One)	Address Unknown
	Farming	Non-Farm	Unknown		

Dear Sir:

The Agricultural Education Department of the University of Minnesota is engaged in a research project to determine some of the human factors associated with farming. As an aid to our study, it is necessary that we locate the current address of some of the men who were former members of the G.I. on-the-farm training program.

Some of these men have moved to different farms and some have left farming since they were enrolled in the training program. We are vitally interested in locating these men who are still farming. We are hoping that you will take a few minutes from your busy schedule to help us in this task.

Enclosed you will find several sheets which have the names and last known addresses of the men from your general area that we are attempting to locate. We would appreciate it very much if you would scan the list and indicate if any of these men are farming in your county. If they are, please indicate their current mailing address. Return the sheets to us in the enclosed envelope.

Thank you for your cooperation.

Sincerely,

enclosures

Date

Dear Sir:

As you have probably heard by now, the Agriculture Education Department is engaged in a research program dealing with men who were members of veterans on-the-farm training programs. Our records show that at one time your school operated such a program.

Some schools have been kind enough to lend us their veterans' training files for use in this project. We are busily engaged with the group of veterans we have identified. Our purpose in writing to you is to "prospect" for a reserve supply of training files, should our present sample prove to be inadequate. Please indicate the availability of your veterans' training records on the lower portion of this sheet and return it to us in the enclosed envelope.

Sincerely,

- -

(Cut along dotted line)

Name of School ______________________________

Town (if different from school) ____________________

Veterans' training records are on file in our school. Yes__ No__

There are about__________ of records on file.
(number)

Dear Sir:

I am writing to ask your cooperation and active participation in a research program in agricultural education. Your participation will consist only of completing the enclosed questionnaire. You are one of five hundred farmers we have chosen to represent the over 18,000 men who participated in the veterans on-the-farm training program at the end of World War II.

The purpose of this study is to identify some of the characteristics that young men should have if they are going to be successful as farmers. We are also interested in the part education plays in the success of the farm business. Since you are still engaged in farming, I assume that you have enjoyed some degree of success or satisfaction from your farm business. Because of the knowledge you have of the problems you faced when you began farming and the experience you have had as a farm operator, I feel you can help identify these characteristics.

Let me assure you that the information you report will be kept in strict confidence. It will be available only to my research assistant and myself. Your name will never appear in any of the reports of this study. Any reports made on the information you give will be based upon the average for all your fellow farmers who reply.

I know that you may feel that I am imposing on your good nature in asking you to assist me by providing this personal information. However, the need for some means of identifying the personal characteristics needed for success in farming is apparent. Only you, and others like you, who have experienced the problems of recently getting established in a farm business can supply the needed information.

I would appreciate it very much if you would complete the questionnaire as accurately as your records will permit. If you have no records for supplying some of the information asked for please estimate the item as closely as you can. You may return the questionnaire in the self addressed envelope enclosed. This information will be most useful to me if you can return the questionnaire within ten days.

I thank you in anticipation of your interest and cooperation.

Sincerely,

enclosure

CONFIDENTIAL

Department of Agricultural Education
University of Minnesota
St. Paul, Minnesota 55101

A. Name ______________ Address ________________________ Date of Birth __________

Children's Names	Age	Last School Grade Attended	Name of Last School Attended	If child is over age 19, his occupation

Highest school grade completed by operator ________
Highest school grade completed by wife __________
How many months of training eligibility did you have under PL 16 & PL 346 ________
How many months of Veterans' on-the-farm training did you attend? __________

If you attended high school, how many years were you enrolled in Voc.Agriculture?__

B. Participation in Adult Education in Agriculture

Name of Course	Are you currently enrolled (yes-no)	If no, year last attended	Approximately how many meetings have you attended in the past five years?
Farm Management			
Enterprise Classes			
Farm Mechanics			
Other (specify)			

C. Are you a renter ____ Owner ____ Partner _____ (Check all that apply).
How many acres do you farm? ______________How many tillable? __________
How many acres do you own? ________________

D. What is the value of your land and buildings? $________(Report only the real estate that you own. If your farm accounts do not carry these items on inventory, please estimate the fair market value of your property).

What would you estimate as the value of your non-farm assets $________(Non-farm assets include such things as household furnishing, stocks and bonds, shares in marketing organizations, cash on hand and in the bank, clothing and other items of a like nature).

E. How much do you still owe on real estate? $ ____________
How much do you still owe on personal property? $ ___________
How much do you still owe on household or non-farm items?__________

What would you estimate to be the value of your total net worth? $ ________
(Net worth equals total assets minus total liabilities).

LIVESTOCK INFORMATION

Kind of Stock	1964 Av. Gain per Head-Pounds	1964 How many Head do you usually sell a year?	1965 Number on hand Jan. 1, 1965	1965 Estimated Value per head, January 1, 1965
Dairy Cows Only	XXXXXXXXXXX			
Other Dairy Cattle	XXXXXXXXXXX			
Beef Cows and Bulls	XXXXXXXXXXX			
Other Beef Breeding	XXXXXXXXXXX			
Beef Feeders				
Sheep-Ewes & Bucks	XXXXXXXXXXX			
Raised Lambs				
Feeder Lambs				
Market Hogs				
Breeding Hogs	XXXXXXXXXXX			
Chickens	XXXXXXXXXXX			
Turkeys	XXXXXXXXXXX			
Other	XXXXXXXXXXX			

CROP INFORMATION

Crop	1964 Acres Grown	Jan. 1, 1965 Amt. on Hand	Crop	1964 Acres Grown	Jan. 1, 1965 Amount on Hand
Corn husked			Sugarbeets		
Oats			Corn Silage		
Barley			Grass Silage		
Wheat			Legume Hay		
Flax			Other Hay		
Rye			Other Crops		
Soybeans					
Potatoes					

The following information should be taken from your Federal Income Tax Report. Please use the information found on the report which you filed on your 1963 farm income. This report was filed about a year ago in 1964.

A. Record these items from the depreciation schedule submitted with the report on your 1963 income.
1. Total depreciation claimed on all items for 1963 . . . .$____
2. How many dollars of this depreciation is classed as additional 1st year depreciation? . . . . $____
3. How many dollars depreciation was claimed on purchased livestock? . . . . $____
4. How many dollars depreciation was claimed on buildings, fences and tiling or other real estate improvements?. . . . .$____

B. If you report your income on the cash basis, complete items 1 through 5 below;
If you report your income on the accrual basis skip to item C below and Omit B.
1. What was the Gross Profits you reported on Schedule F, Form 1040, Pg. 1, Part IV, Line 3? . . . .$____
2. What was the net farm profit of loss you reported on Schedule F, Form 1040 Pg. 1, Part IV, Line 8? . . . . $____
3. What was the amount reported on Schedule D, Pg 2, Form 1040, Part IV, Line 1?$____
4. What was the amount reported on Schedule D, Pg 2, Form 1040, Part IV, Line 2?$____
5. What was the amount reported on Schedule D, Pg 2, Form 1040, Part IV, Line 3?$____

C. Use this portion only if you file your tax on the accrual basis:
1. What was the Gross Profit-Schedule F, Pg 2, Part VII, Form 1040, Line 5? . . $____
2. What was the Net Profit -Schedule F, Pg 2, Part VII, Form 1040, Line 10? . .$____

Dear Sir:

A couple of weeks ago Dr. Cvancara asked you to provide us with some information on your family and your farm business. We would like to use this information in determining if we can be of more assistance in helping young men to make a successful start in farming.

Since you are in the unique position of having started in the farm business fairly recently, you are in the best position to provide the information needed in this study.

I realize that the questions are personal. This is why we insist that your replies be kept in strict confidence. None of the material you supply will be available to any other agency or organization.

If perhaps you have misplaced the original letter, we are enclosing another copy of the survey form. Now that income tax time is past, perhaps your records will be more readily available. Please note that the survey calls for information on your 1963 income, not your 1964 income.

We know that you have an interest in building a strong, profitable farm business. We hope that you will provide the information that will help other beginning farmers also get started on the way to a successful farm life.

Sincerely,

Name of Child ____________________ Name of Parent ____________________

STANDARDIZED TEST RECORD

Name of Test	F.M.	Yr. Given	Grade	C.A.	M.A.	Grd. Equiv.	%Rank	Norm
Achievement								
Scholastic Aptitude								

Date

Dear Sir:

The Agricultural Education Department of the University of Minnesota is involved in a research project sponsored by the U.S. Office of Education in which we need your assistance.

Part of the current study involves the relationships that exist between the aptitude and achievement of rural children and the relative financial success of the parents' farm business. We have collected some of the information on farm business success from farmers within your school area.

We would like your cooperation in providing us with data on the childrens' aptitude and achievement. We have enclosed with this letter, a list of the children with whom we are concerned. They are listed by parents name, child's name and last school grade attended.

We are asking that you respond by listing the aptitude test scores (indicating the name of the test administered) for each of the children named. If several tests of the same type have been recorded for the same child, please indicate the average of the last two tests administered. An example of the method preferred for recording is shown on the data sheet.

The information you supply will be used in an analysis of the relationship suggested above. The information will be kept in strict confidence. No individual will be able to identify himself or any other person with the information published as a result of this effort. Only sums and averages will be utilized in compiling the final narrative report.

If you have any question regarding the use we will make of the data you supply, please contact us.

Thank you for your cooperation.

Sincerely,

TABLE XXXIV

TABLE OF WORK UNITS

Enterprise	Unit	*1949 Work Units	**1964 Work Units
Dairy Cows	Head	14.0	10.0
Other Dairy Cattle	Animal Unit	4.0	3.5
Beef Breeding Herd	Animal Unit	4.0	3.5
Feeder Cattle	C.W.T.	.4	.25
Sheep - Farm Flock	Animal Unit	1.8	1.5
Sheep Feeders	C.W.T.	.3	.3
Hogs	C.W.T.	.3	.2
Turkeys	C.W.T.	.7	.2
Hens	Per 100 hens	22.0	20.0
Peas and Small Grain	Acre	.7	.5
Soybeans	Acre	.7	.3
Sugarbeets	Acre	3.0	3.0
Sweet Corn	Acre	1.1	.7
Corn - Husked	Acre	1.1	.7
Corn - Silage	Acre	1.7	1.0
Hay - Alfalfa	Acre	.9	.6
Hay - Other	Acre	.6	.4

* Adapted from the "Annual Report of the Farm Management Service for Veterans Taking On-The-Farm Training", Mimeo Report 176, Director of Agricultural Economics, University of Minnesota, July 1949.

** Adapted from the "1964 Annual Report, Vocational Agriculture Farm Analysis," Austin Area Vocational School, Austin, Minnesota, April, 1965.

APPENDIX B

TABLE XXXV

PARTIAL REGRESSION COEFFICIENTS FOR ALL VARIABLES: MULTIPLE REGRESSION ANALYSES WITH GROSS INCOME AS THE CRITERION MEASURE

Variable	Sample N = 528	Sub-Sample 1 N = 210	Sub-Sample 2 N = 116
Age at Beginning of Training	- 311.000*	- 368.600*	- 477.400*
Beginning Tenure Status	- 872.800	-2186.000*	-2732.000*
Total Beginning Capital	.356*	.365*	.651*
Size of Business-Work Units	3.294	3.051	- 4.279
Number of Years as Operator	589.500*	48.740	- 732.900
Months I.O.F.T. Completed	- 18.190	74.660	32.090
Size of Business-Tillable Acres	13.950*	12.240	14.870
Number of Children-Ending	92.040	350.100	188.100
Highest School Grade Completed	264.400	- 115.600	- 644.500
Years of High School Vo-Ag.	239.600	746.200	1168.000
G.C.T. Score	xxx	- 23.770	89.360
M.A.T. Score	xxx	xxx	- 167.300*
Ratio: $\frac{\text{Total Fixed Capital}}{\text{Total Beginning Capital}}$	-5434.000*	- 644.800	-2059.000
Ratio: $\frac{\text{Beginning Net Worth}}{\text{Total Liabilities}}$	- .107	- .131	- .403
Number of Adult Classes Attended	53.640*	40.200	48.170
Ratio: $\frac{\text{Months I.O.F.T. x 25}}{\text{Total Capital}}$	-7477.000	-6082.000	3975.000
Regression Equation Constant	7321.589	22229.681	48290.000
Standard Error of Estimate	8785.000	8105.900	8800.100

* Variable significant at the .05 level.

TABLE XXXVI

PARTIAL REGRESSION COEFFICIENTS FOR ALL VARIABLES: MULTIPLE REGRESSION ANALYSES WITH NET INCOME AS THE CRITERION MEASURE

Variable	Sample N = 528	Sub-Sample 1 N = 210	Sub-Sample 2 N = 116
Age at Beginning of Training	- 27.710	29.500	- 79.990
Beginning Tenure Status	- 276.600	- 709.400	- 428.400
Total Beginning Capital	.047*	.087	.158
Size of Business-Work Units	- 1.639	- 3.632	- 4.247*
Number of Years as Operator	174.900	236.900	- 139.000
Months I.O.F.T. Completed	27.170	31.650	- 21.220
Size of Business-Tillable Acres	1.646	.540	.741
Number of Children-Ending	58.180	154.900	- 73.490
Highest School Grade Completed	252.300*	284.900	- 16.950
Years of High School Vo-Ag.	- 153.100	- 155.900	- 56.990
G.C.T. Score	xxx	1.079	1.468
M.A.T. Score	xxx	xxx	- 2.295
Ratio: $\frac{\text{Total Fixed Capital}}{\text{Total Beginning Capital}}$	-1522.000	-1129.000	- 616.000
Ratio: $\frac{\text{Beginning Net Worth}}{\text{Total Liabilities}}$	- .005	- .058	- .012
Number of Adult Classes Attended	- 6.117	- 20.450	- 3.557
Ratio: $\frac{\text{Months I.O.F.T.} \times 25}{\text{Total Capital}}$	-3732.000*	-4767.000	1721.000
Regression Equation Constant	-1704.708	3560.922	8629.503
Standard Error of Estimate	3491.700	4912.200	2246.300

* Variable significant at the .05 level.

TABLE XXXVII

PARTIAL REGRESSION COEFFICIENTS FOR ALL VARIABLES: MULTIPLE REGRESSION ANALYSES WITH YEARLY GAIN IN NET WORTH AS THE CRITERION MEASURE

Variable	Sample N = 528	Sub-Sample 1 N = 210	Sub-Sample 2 N = 116
Age at Beginning of Training	- 41.320*	- 64.660*	- 82.370*
Beginning Tenure Status	- 77.890	- 131.900	- 267.900
Total Beginning Capital	.058*	.058*	.083*
Size of Business-Work Units	.621	.660	1.139
Number of Years as Operator	98.390*	147.300*	- 21.070
Months I.O.F.T. Completed	- 11.510	- 4.375	9.503
Size of Business-Tillable Acres	2.627*	3.136*	2.305
Number of Children-Ending	- 44.730	9.749	- 25.040
Highest School Grade Completed	31.030	- 13.910	20.480
Years of High School Vo-Ag.	54.310	113.200	160.100
G.C.T. Score	xxx	- .352	8.748
M.A.T. Score	xxx	xxx	- 14.150
Ratio: $\frac{\text{Total Fixed Capital}}{\text{Total Beginning Capital}}$	- 347.300	473.400	671.100
Ratio: $\frac{\text{Beginning Net Worth}}{\text{Total Liabilities}}$	.008	.032	.040
Number of Adult Classes Attended	12.000*	.294	1.449
Ratio: $\frac{\text{Months I.O.F.T. x 25}}{\text{Total Capital}}$	552.900	866.400	1551.000
Regression Equation Constant	941.379	679.222	3556.412
Standard Error of Estimate	1471.600	1400.700	1393.400

* Variable significant at the .05 level.

TABLE XXXVIII

PARTIAL REGRESSION COEFFICIENTS AND OTHER REGRESSION EQUATION COMPONENTS FOR SELECTED VARIABLES WITH GROSS INCOME AS THE CRITERION MEASURE

Variable	Sample N = 528	Sub-Sample 1 N = 210	Sub-Sample 2 N = 116
Age at Beginning of Training	- 330.700*	- 330.700*	- 441.600*
Beginning Tenure Status	- 885.700	- 2242.000*	- 2686.000*
Total Beginning Capital	.413*	.438*	.603*
Number of Years as Operator	524.700	65.300	- 526.400
Size of Business-Tillable Acres	16.670*	13.400	10.620
Highest School Grade Completed	291.400	- 154.200	- 575.100
Years of High School Vo-Ag.	270.400	927.200	- 1103.000
M.A.T. Score	xxx	xxx	- 85.200*
Ratio: $\frac{\text{Total Fixed Capital}}{\text{Total Beginning Capital}}$	- 5376.000*	- 393.100	- 1391.000
Ratio: $\frac{\text{Beginning Net Worth}}{\text{Beginning Total Liabilities}}$	.096	- .157	- .417*
Number of Adult Classes Attended	58.930*	51.620	42.210
Regression Equation Constant	7339.595	20662.669	45980.750
Standard Error of Estimate	8801.100	8142.900	8703.100
R^2	.253	.285	.385

* Variables significant at the .05 level.

TABLE XXXIX

PARTIAL REGRESSION COEFFICIENTS AND OTHER REGRESSION EQUATION COMPONENTS FOR SELECTED VARIABLES WITH NET INCOME AS THE CRITERION MEASURE

Variable	Sample N = 528	Sub-Sample 1 N = 210	Sub-Sample 2 N = 116
Beginning Tenure Status	- 475.000*	- 718.200*	- 582.800*
Total Beginning Capital	- .046*	.091	.160*
Size of Business-Work Units	- 1.013	- 3.586	- 4.802*
Highest School Grade Completed	228.900*	218.000	- 9.697
Ratio: I.O.F.T. x 25 / Total Beginning Capital	-2,521.000	-3,056.000	914.600
Regression Constant a=	1,597.098	2,704.978	3,541.990
Standard Error of Estimate	3,501.200	4,859.400	2,183.400
R^2	.059	.055	.258

* Variables significant at the .05 level.

TABLE XL

PARTIAL REGRESSION COEFFICIENTS AND OTHER REGRESSION EQUATION COMPONENTS FOR SELECTED VARIABLES WITH YEARLY GAIN IN NET WORTH AS THE CRITERION MEASURE

Variable	Sample N= 528	Sub-Sample 1 N = 210	Sub-Sample 2 N= 116
Age at the Beginning of Training	- 49.650*	- 62.550*	- 76.450*
Total Beginning Capital	.043*	.049*	.065*
Number of Years as Farm Operator	78.810	143.600*	22.670
Size of Business- tillable acres	3.927*	4.158*	3.904*
M.A.T. Score	xxx	xxx	- 9.264
Number of Adult Classes Attended	13.820*	2.531	- .292
Regression Equation Constant	1259.785	595.176	3631.170
Standard Error of Estimate	1486.500	1394.000	1400.100
R^2	.178	.189	.251

* Variable significant at the .05 level.

TABLE XLI

CORRELATION COEFFICIENTS BETWEEN THE VARIOUS QUANTITIVE PREDICTIVE VARIABLES AND CRITERION MEASURES. TOTAL SAMPLE N = 528

	1	2	3	4	5	6	7	8
1. Age at the Beginning of Training		.2702**	.2017**	-.0480	-.1562**	.2804**	.1192**	-.2133**
2. Beginning Tenure Status			.4357**	-.1423**	.0029	.2385**	-.2807**	.0207
3. Total Beginning Capital				.2345**	-.1946**	.1199**	.1713**	.0919*
4. Size of Business - Work Units					.0022	-.0185	.4737**	.1008*
5. Number of Years as Farm Operator						.1357**	-.0987*	.0343
6. Months of I.O.F.T. Completed							-.1114*	-.0246
7. Size of Business - Tillable Acres								.0231
8. Number of Children - Ending								
9. Highest School Grade Completed								
10. Years of High School Vo-Ag.								
11. G.C.T. Score								
12. M.A.T. Score								
13. Ratio: Total Fixed Cap./Total Begng. Cap.								
14. Ratio: Begng. Net Worth/Total Capital								
15. Number of Adult Classes Attended								
16. Ratio: I.O.F.T. x 25/Total Capital								
17. Gross Income								
18. Net Income								
19. Yearly Gain in Net Worth								

* The correlation coefficient is significantly different from zero at the .05 level when it exceeds .088.

** The correlation coefficient is significantly different from zero at the .01 level when it exceeds .115.

The numbers in the column headings refer to the same factors as the corresponding rows. See next page for variables 9 - 18.

TABLE XII(continued)

	9	10	11	12	13	14	15	16	17	18	19
1.	-.2283**	-.1151**	-.2776**	-.2597**	.2043**	.1588**	-.1286**	.1169**	.2164**	-.0800	.1579**
2.	-.1280**	-.0762	-.0720	-.0594	.7866**	-.1223**	-.1251**	-.2619**	-.1682**	-.1173**	-.1003*
3.	-.0085	-.0482	-.0754	-.0688	.4412**	.0259	-.0346	-.5510**	.2493**	.0756	.2457**
4.	.1458**	.0715	.0877	.0810	.0823	.1062*	.0956*	-.1846**	.2611**	.0438	.2434**
5.	-.0178	.0325	.0477	-.0229	-.0083	-.0906*	.0201	.2392**	.0181	.0300	.0265
6.	-.0947*	-.0680	-.2128**	-.1674**	.2102**	-.0185	-.0762	.1276**	-.1076*	.0106	-.1071*
7.	.1407**	.0429	.0134	.0438	-.1770**	.0640	.0938*	-.1444**	.3115**	.1043*	.2954**
8.	.0567	.0403	.0210	.0016	.0369	-.1209**	.0415	.0985*	.1125*	.0650	.0054
9.		.4078	.0904*	.0835	-.0959*	.0077	.1570**	.0412	.1719**	.1561**	.1432**
10.			.1152**	.0955*	-.0667	.0913*	.1347**	.0069	.0891*	.0243	.0910*
11.				.6497**	.0505	.0100	.0812	.0518	.0166	.0442	.0413
12.					-.0363	.0322	.1026*	.0305	.0379	-.0035	.0270
13.						.1544**	-.0724	-.2725**	-.1374	-.1144*	-.0630
14.							-.0039	-.0593	-.0192	.0082	.0472
15.								-.0449	.1525**	.0139	.1630**
16.									.1963**	-.0965*	-.1257**
17.										.3298**	.5379**
18.											.1567**
19.											

* The correlation coefficient is significantly different from zero at the .05 level when it exceeds .088.

** The correlation coefficient is significantly different from zero at the .01 level when it exceeds .115.

The numbers in the column headings refer to the same factors as the corresponding rows.

TABLE XLII

CORRELATION COEFFICIENTS BETWEEN THE VARIOUS QUANTITIVE PREDICTIVE VARIABLES AND CRITERION MEASURES. TOTAL SAMPLE N = 210

	1	2	3	4	5	6	7	8
1. Age at the Beginning of Training		.2190**	.1522*	.0244	-.0766	.2477**	-.0195	.0660
2. Beginning Tenure Status			.4514**	-.0557	-.0805	.1956**	-.2891**	.0441
3. Total Beginning Capital				.2342**	-.2296**	.0801	.1470*	.1315
4. Size of Business-Work Units					-.0083	-.0400	.4044**	.2140**
5. Number of Years as Operator						.1914**	-.1028	.0262
6. Months of I.O.F.T. Completed							-.1736*	.0253
7. Size of Business-Tillable Acres								.0306
8. Number of Children-Ending								
9. Highest School Grade Completed								
10. Years of High School Vo-Ag.								
11. G.C.T. Score								
12. M.A.T. Score								
13. Ratio: Total Fixed Cap./Total Begng. Cap.								
14. Ratio: Begng. Net Worth/Total Liability								
15. Number of Adult Classes Attended								
16. Ratio: I.O.F.T. x 25/Total Capital								
17. Gross Income								
18. Net Income								
19. Yearly Gain in Net Worth								

* The correlation coefficient is significantly different from zero at the .05 level when it exceeds .135.

** The correlation coefficient is significantly different from zero at the .01 level when it exceeds .178.

The numbers in the column headings refer to the same factors as the corresponding rows. See next page for variables 9 - 19.

TABLE XLII (continued)

	9	10	11	12	13	14	15	16	17	18	19
1.	-.1224	-.0774	.0541	-.1701*	.1181	.2157**	-.1704*	-.1062	-.2017**	.0027	-.1641*
2.	-.0652	.0975	.1390*	.0169	.6919**	.2011**	-.1418*	-.2583**	-.2038**	-.0936	-.0508
3.	.0174	.0324	.0535	-.0242	.3811**	.0086	.0343	.5490**	.2701**	.1014	.2720**
4.	.1256	.2006**	-.0907	-.0765	-.0061	.1669*	.1632*	-.2371**	.2523**	-.0295	.2416**
5.	-.0510	-.0173	-.0532	-.1281	.1423	.0579	.0230	.2488**	-.0570	.0348	.0584
6.	-.0784	-.1281	.0817	-.0346	.1573*	-.0815	-.1229	.1828**	-.0583	.0369	-.0633
7.	.1563*	.1158	-.0160	-.0699	-.1048	.0365	.1368	-.1529*	.3126**	.0533	.2914**
8.	.0656	.1714*	-.0012	-.0246	.0979	-.1683*	.1765*	.1417*	.2002**	.1767	.0087
9.		.4343**	.0682	.0687	-.0887	.0372	.1793**	-.0254	.0978	.0980	.0815
10.			.0513	.0484	-.1284	.1003	.1725*	-.0803	.1583*	.0100	.1261
11.				.2614**	.1497*	.0005	-.0056	.0266	-.1016	-.0054	-.0128
12.					.0393	.0561	.0849	.0010	.0278	-.0497	-.0045
13.						-.1824**	-.0386	-.2135**	-.0985	-.0912	.0372
14.							-.0219	-.0683	-.0326	-.0291	.0724
15.								-.0697	.1844**	-.0367	-.1226
16.									-.2159**	-.0958	.0842
17.										.2357**	.4097**
18.											.0696
19.											

* The correlation coefficient is significantly different from zero at the .05 level when it exceeds .135.

** The correlation coefficient is significantly different from zero at the .01 level when it exceeds .178.

The numbers in the column headings refer to the same factors as the corresponding rows.

TABLE XLIII

CORRELATION COEFFICIENTS BETWEEN THE VARIOUS QUANTITIVE PREDICTIVE VARIABLES AND CRITERION MEASURES. TOTAL SAMPLE N = 116

	1	2	3	4	5	6	7	8
1. Age at the Beginning of Training		.1482	.0721	-.0271	-.1886	.0904	-.0037	-.1557
2. Beginning Tenure Status			.3541**	.0408	.0976	.1256	-.2324*	.1657
3. Total Beginning Capital				.2482**	-.3299*	-.0159	.2128*	.1333
4. Size of Business-Work Units					-.0219	.0140	.4025**	.1955*
5. Number of Years as Operator						.2873**	-.1376	-.0054
6. Months of I.O.F.T. Completed							-.0804	.1968
7. Size of Business-Tillable Acres								-.0168
8. Number of Children-Ending								
9. Highest School Grade Completed								
10. Years of High School Vo-Ag.								
11. G.C.T. Score								
12. M.A.T. Score								
13. Ratio: Total Fixed Cap./Total Begng. Cap.								
14. Ratio: Begng. Net Worth/Total Liability								
15. Number of Adult Classes Attended								
16. Ratio: I.O.F.T. x 25/Total Capital								
17. Gross Income								
18. Net Income								
19. Yearly Gain in Net Worth								

* The correlation coefficient is significantly different from zero at the .05 level when it exceeds .132

** The correlation coefficient is significantly different from zero at the .01 level when it exceeds .238.

The numbers in the column headings refer to the same factors as the corresponding rows. See next page for variables 9 - 19.

TABLE XLIII (continued)

1.	-.0495	.0218	-.0313	-.0898	.0117	.2474**	-.1835*	-.1926	-.2022*	-.1041	.1572
2.	-.0553	-.0606	.1130	.0666	.5440**	-.2308*	-.1721	-.1946*	-.1969*	-.0997	-.0994
3.	.0592	.0023	-.0342	.0147	.2461**	.0740	-.0394	-.5676**	.3611**	.3389**	.3771**
4.	.0713	.2265*	-.2321*	-.1989*	.0769	.1838	.2089*	-.2476**	.1764	-.1653	.2856**
5.	-.0812	-.1084	-.0918	-.1645	-.1407	-.0776	.0411	.3387**	-.1240	-.1835*	-.0645
6.	-.0174	.0107	.0569	.0263	.1244	-.1690	-.0549	.2271*	-.0395	-.1429	.0050
7.	.1611	.0679	.0149	.0817	.0456	.0254**	.0791	-.1743	.2550	.0775	.2968**
8.	-.0430	.0408	.0361	.0590	.2320*	-.2409**	.2667**	.0034	.1232	-.0907	.0253
9.		.4227**	.0359	.0266	-.0824	.0290	.1882*	.0027	.0186	.0186	.0616
10.			.0270	.0141	-.0942	.1586	.1261	-.0528	.0947	-.0829	-.0297
11.				.8696**	.0993	-.0352	-.0109	.0236	-.1878*	.0110	-.1188
12.					.0669	-.1052	.0205	.0158	-.1840*	.0527	-.1240
13.						-.2418**	-.0167	-.1385	-.0544	-.0975	-.0910
14.							-.0294	-.1122	-.0750	.0262	.1487
15.								-.0647	.1498	-.0704	.0342
16.									-.1897*	-.1319	-.1435
17.										.2686**	.3766**
18.											.1640
19.											

* The correlation coefficient is significantly different from zero at the .05 level when it exceeds .182.

** The correlation coefficient is significantly different from zero at the .01 level when it exceeds .238.

The numbers in the column headings refer to the same factors as the corresponding rows.